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THE IRON AND STEEL TRADES JOURNAL

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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES' EQUIPMENT AND SUPPLIES ASSOCIATION.

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Telephone: Central 1893. Telegrams: CIRA.
The B.C.I.R.A. Scottish Laboratories are:—
Foundry Technical Institute, Meek's Road, Falkirk (Telephone 326).

Forthcoming Events.

Institute of British Foundrymen.

MARCH 3.

Birmingham, Coventry and West Midlands Branch:—Ordinary meeting. Short Papers to be read.

MARCH 5.

East Midlands Branch:—Annual dinner at Nottingham.

Lancashire Branch:—Ordinary meeting at Manchester. "Some Notes on the Centrifugal Casting Process," Paper by J. E. Hurst.

Scottish Branch:—Ordinary meeting at Glasgow. "Heat-Treatable and other Special Cast Irons," Paper by A. B. Everest, Ph.D., B.Sc.

An Interesting Clause.

We are not always very successful when we embark upon legal matters, but our readers are invariably so kind that the final result straightens out matters in a satisfactory manner. The most recent matter requiring interpretation is Part III, Clause 13, of the Import Duties Bill. This reads: "Where it is shown to the satisfaction of the Commissioners that any goods are being imported solely with a view to the re-exportation thereof (*a*) after undergoing a process in the United Kingdom which will not change the form or character of the goods; or (*b*) after transit through the United Kingdom, or by way of transhipment, the Commissioners may, subject to such conditions as they think fit to impose, allow the goods to be imported free of any duty chargeable under this Act."

A few foundry owners seemed to imagine that this clause would allow manufacturers to import castings, assemble them, and to re-export them, without paying any import duty. With this attitude we cannot agree. We feel that it is designed to cover the following type of eventuality. A British firm receives an order for some machinery for a sugar-cane factory, and with it they are asked to supply 500 rice bowls. All the goods except the rice bowls are made in their own foundry, but they decide to buy the pots from the Continent. In order to take advantage of the cost of bulk consignment of the goods, they have the rice bowls sent to their works, where they are inspected, re-packed, and then shipped along with the balance of the order. Here is a distinct case for the operation of the clause, as the goods have "undergone a process" but not been materially "changed in form or character." A second case would be covered by the following assumption. A machine was supplied some years ago to a foreign country, and an order is now received for a second one, but of the latest design, and also for a spare part of the old machine. Now, it may so happen that, so far as the spare part is concerned, the pattern may be lying in Belgium. Thus, whilst the new machine is being made, the spare part would be made in Belgium, delivered to Great Britain and re-exported after inspection and perhaps drilling a few holes to a template. Here, again, we suggest that even though it has undergone a process, its basic form and character have not been materially changed. It is obvious that it is this phrase, "after undergoing a process," which has unduly disturbed the minds of several foundry-owners, yet what processes can be envisaged which do not change the form or character of a casting? Machining changes its designation from "in the rough" to "machined," whilst the mere drilling of a few holes would alter a pure casting into "an oven backplate."

We naturally should be happy to have any views which express contrary views.

Sand Testing.

The Paper recently printed in our columns by Mr. Buchanan will be read by all foundrymen with considerable interest. We say *all* foundrymen advisedly, because moulding sand is the one material common to all founding operations, whether they be non-ferrous, cast iron, malleable iron or steel The Paper is remarkable in that it forms a definite attempt on the part of one particular works to apply information derived from the researches of the British Cast Iron Research Association, with a view to seeing how far the claims made by the Association were capable of realisation. The result in this respect was noteworthy, for it showed not only a 50 per cent. saving in new sand, but a 50 per cent. increase in strength and an appreciable increase in permeability. It is well known that nearly every trouble with which the founder is faced as a consequence of poor moulding sand can be traced to deficiencies which can be assessed by measuring either or both of these two properties; hence the decision to concentrate on their regular measurement and control as a means of regulating the quality of sand from day to day. Cases have been known in which the foundry may go on for years making satisfactory castings with little or no attention to the floor sand, but sooner or later the gradual and inevitable deterioration in properties brings Nemesis in its train, and a batch of spoiled castings is the result. We submit that it should be the aim of every good foundryman to maintain his floor sand in such a condition that it may be used indefinitely. In other words, the addition of new sand and the reconditioning from day to day should just offset the deterioration referred to above. Many jobbing foundries have never given this matter the attention it deserves. The introduction of mechanised processes, however, has been found to necessitate much more attention to moulding sand than appears necessary in the jobbing foundry.

The Paper is remarkable from another point of view. It forms an admirable example of what is now described as the development work necessary in any manufacturing organisation for the purpose of applying to a particular line of manufactured goods the information obtained by scientific research. It is now generally recognised that to make the fullest use of scientific research a stage of development is required after the original work is accomplished, and that this second stage may take just as much time and may, indeed, be just as costly as the original

(*Concluded on next page.*)

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

A Paper "Wangle."

To the Editor of The Foundry Trade Journal.

Sir,—I note from your leader that Mr. Gray's remarks, whilst "slightly exaggerated" are "mathematically correct." This is something new in foundry parlance, hence, must bear examination.

One bundle of wood costs a halfpenny, and 14 lbs. of coal at 25s. 9d. per ton is on record of daily consumption for lighting cupola fires, so that the weekly expenditure for five working days in this respect amounts to the huge sum of 2½d. and 1s. 8d. respectively, whether the total melt is 10, 20 or 30 tons for the period.

Therefore, "mathematically-correct" figures would be 2.25d., 1.125d. and 0.5,625d. *per ton*, to the fourth decimal, and if this not sufficiently accurate for costing purposes to satisfy the most scrupulous critic, or even Einstein's Theory of Relativity, many foundrymen would gladly pass on this phase of the business to more competent hands, preferably expert critics, with strict injunctions not to exceed the economic limit. Could they respond?—Yours, etc.,

G. Moran,
Manager.

Reliance Foundry Company,
Birmingham Street,
Kings Hill, Wednesbury.
February 16, 1932.

Census of Production.

To the Editor of The Foundry Trade Journal.

Sir,—Your leader in the issue of February 4 on the Census of Production figures for 1930 is interesting, and I am sure we should much appreciate if you would extend your investigations a little further, as there are several points which require elucidation.

According to your figures, the output per head is only 13s. per man per day, and this certainly does not seem an economic figure. Does the census give the average wage per day for the industry? Similarly, the average price per cwt. for castings would seem to work out at a figure of 17s. per cwt.—surely this price seems to be high. Even 15s. per cwt., one would think, is a high figure for castings being produced to-day.

If these figures are correlated and averaged, it would appear that the output per man per day in castings is approximately 90 lbs. in weight—surely this is very much too low. It would be very interesting if we could obtain some reliable figures regarding output per man, so that other foundries could judge their efficiency. I should imagine that on to-day's prices the average production in a jobbing foundry for everyone included, such as labourers, dressers and cupola men, must be in the neighbourhood of 1½ cwt. per day, and even this figure is probably on the low side.—Yours, etc.,

Arthur S. Murdoch
(The Shotts Iron Company, Limited).
Foundry Department, Shotts.
February 15, 1932.

[The complete report issued by the Board of Trade was given in our issue of January 28, pages 70 and 71. From it will be seen that foundries employing less than ten men were excluded, and that less than 33 per cent. of the total were included. The ground covered does, however, include both the most expensive and the very cheapest castings made, and for computation a mental picture of the relative weights must be drawn.—Editor.]

Sand Testing and Economy.

To the Editor of The Foundry Trade Journal.

Sir,—I have read with considerable interest the Paper presented to the Scottish Branch of the Institute on "Sand Testing," by Mr. W. Y. Buchanan, appearing in your issues dated February 12 and 18. The appearance of this Paper is particularly apt at the present time.

One of the constant difficulties obtaining in the foundry industry is the lack of standards by means of which sand preparation can be judged. Mr. Buchanan has found from practical experience that the already existing apparatus of the B.C.I.R.A. suitably modified gives, within limits of practical application in the foundry, regular information enabling the very best advantages of modern methods of sand treatment and preparation to be gained.

It was a source of satisfaction to us to find that the type of sand mixer installed as the result of the tests conducted by Mr. Buchanan was the Simpson Patent Intensive Sand Mixer, fitted with our aerator, and the fact that with this equipment the author obtains a saving of roughly 50 per cent. of new sand, is, as he himself says, ". . . in itself sufficient justification for the installation of milling plant."

If only more foundrymen would adopt sand testing as a regular practice in their foundry, and the mixing of their moulding sands in modern, efficient sand mixers, very considerable economies in production costs would be obtained by the industry at a time when there is the greatest need for making every possible saving.—Yours, etc.,

G. E. France.

August's Muffle Furnaces, Limited,
Halifax.
February 22.

Sand Testing.

(Concluded from previous page.)

work itself. The present Paper is valuable as a successful instance of this development work, and it is, in one sense, unfortunate that it should be so. It stands out because this development stage is fully accomplished in only a small number of cases, whereas it should be general.

We understand that some of the testing proposals made by Mr. Buchanan are already recommended by the Research Association, which, we are quite sure will welcome the application of its proposals in the works, and the critical examination which this involves.

Incidentally, the Paper indirectly demonstrates the importance of testing British sands on British lines, and of avoiding the adoption of ready-made testing methods and apparatus found to be suitable in other countries for sands of a type quite different from those commonly found in this country. Furthermore, the tests cannot be applied mechanically or unintelligently, if the best results are to be obtained.

Scientific Instruments.—A postcard received from Cambridge Instrument Company, Limited, 15, Grosvenor Gardens, London, S.W.1, serves as a reminder that this firm has a range of instruments for controlling the flow of gas, oil, air, water and electricity.

Castings.—A. Hendra & Son, Townmead Iron Foundry, Beddington Lane, Croydon, have utilised an eight-page catalogue to emphasise that they are exceedingly well placed to serve the London area for its castings requirements. The booklet, in addition to illustrating the new foundry they have recently constructed, deals with their strategic geographical position for rapid delivery, and the types of work for which their lay-out and experience are best suited.

Random Shots.

Heigh ho! come to the Fair.

That's the cry of the moment, and certainly the opening day of the Fair went with a fine swing. As encouraging as it is to know that this year there are more exhibitors, it is still more encouraging to hear that there are more overseas buyers. A contingent of 600 business men from Denmark is a happy indication of our trade relationships with that country, and these will no doubt be strengthened in the near future. "Marksman" learns that two all-British exhibitions are to be held in Copenhagen in September. One is to be a purely commercial show, and the other will deal with art applied to British products.

* * *

If I was asked to name the coldest spot in Great Britain in February, I should strenuously put forward the claims of Castle Bromwich on Press View day. The majority of the Stands were clad in white nighties, to keep them warm and dry, so that the Mecca of the pilgrims was the Stand of Shell Mex-B.P., with its magnificent array of furnaces, all in operation. The authorities did their best, and the through-carriage from London was much appreciated, as the refrigerator-like "express" from New Street to Castle Bromwich—a never-to-be-forgotten nightmare, was thoughtfully eliminated.

* * *

If a vote by the people actually in charge of the Stands were taken, the majority in favour of a later date would be in the neighbourhood of 99 per cent., the only dissentients being those stationed at Mecca and the immediate vicinity to leeward.

* * *

One of the features at Olympia is the section of plastic materials. The trade is said to have multiplied ten times in two and a-half years, and brassfounders and other metalworkers will probably not doubt the statement.

* * *

Last week I mentioned an amusing incident which happened in a Continental foundry, and in which a certain Mr. X took part. I am pleased to add to that another. It took place in Spain. Let Mr. X tell the story: "I had been there nearly three months, and was able to understand and speak the language quite well. One evening, about 4.30 p.m., I was in a cupola when the man with me informed me that at 5.0 there was going to be a strike at the works. Sharp to time he downed tools and left the job. At 5.5 he came back, scrambling through the breast-hole as if the devil were behind him, and informed me the strike was over. At 5.30 I found the reason for his hurry to return—two soldiers were outside the cupola with fixed bayonets!"

* * *

Mr. Norman Birkett humorously explained at the dinner of the Auctioneers' Society, recently, a certain contrast between the legal and surgical professions. A barrister, he said, after addressing the Court, wonders anxiously if he has left anything out. The surgeon, when he completes a case, wonders with equal anxiety if he has left anything in!

* * *

The kind old gentleman was asking the little boy why he was crying.

"Please, sir, Johnnie has got the gripes," was the answer.

"But, surely, that is nothing for you to cry about."

"It is, 'cause they were my gripes."

Marksman.

The British Industries Fair.

BIRMINGHAM SECTION.

This annual manifestation is becoming more and more an exhibition of foundry products and less and less one of its raw materials and equipment. Moulding machines have been reduced to one firm, while sand-blasting apparatus has disappeared. The one section which has been improved is that dealing with oil furnaces, due to a composite stand organised by Shell-Mex & B.P.

RAW MATERIALS.

The new alloy, M.V." C," which has been developed in the foundry of the Metropolitan-Vickers Electrical Company, Limited, Trafford Park, Manchester, is being shown for the first time, and as such will be critically examined by the foundrymen when they visit the exhibition on March 1. Of the many alloys offered to the foundry industry in recent years, this particular one certainly has created much interest.

Refractories, specially evolved for the foundry industry, are being shown by Gibbons, Limited, of Dudley, while pig-iron is shown by Staveley Coal & Iron, Stanton Ironworks Company, Stewarts & Lloyd, and the United Steel Companies, Limited.

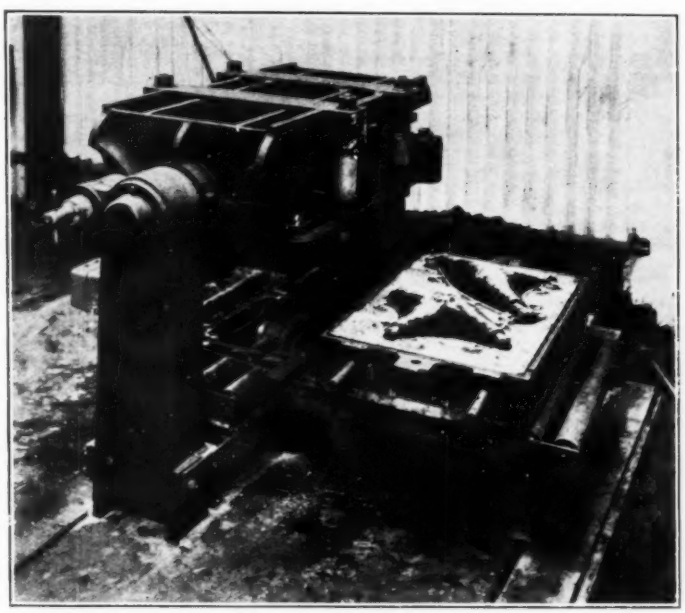
TRANSPORT.

Whilst many founders have been regarding cast-iron roads as a possible outlet for their production, we believe that after seeing the one laid on the Stand of the Stanton Ironworks Company, Limited, they will realise that design is of paramount importance, and they will probably, as we have done, wonder whether it is not an ideal method of roadway for their own foundries, and may even envisage its use for factory floorings.

A very interesting and decidedly novel form of conveyor is installed outside the exhibition by the Bloomfield Steel Construction Company. It takes the form of a portable mono-rail transporter, and is so flexible that on the level it can do everything expected of a wheel-barrow. Other contributions to the solution of the transport problem are to be seen on the stands of Ley's Malleable Castings Company, Limited, of Derby; Redler Patents, of Sharpness, Gloucester, and Fraser & Chalmers, of Erith.

FURNACES.

Due to enterprise of Shell-Mex & B.P., Limited, foundrymen can see in operation several competing types of oil-fired furnaces erected side by side on the stand. Now that Mr. Hurst has popularised the heat-treatment of cast iron, the tool-hardening furnace by Alldays & Onions, Limited, will no doubt be examined in that light. British Reverberatory Furnaces, Limited, have included both the Midget and Pigmy, both of which are well known to and appreciated by our readers. Morgan Crucible Company, Limited, are showing one from their extensive range of tilting furnaces. An exceptional low zinc loss when melting 60:40 brass is a characteristic feature. Sir W. G. Armstrong Whitworth & Company, Limited, have their semi-rotary open-flame type of furnace on exhibition on this stand. It is a flexible, well designed piece of plant capable of a wide variety of duties, and is extremely simple in construction and operation.



A NEW TYPE OF MAGNETIC MOULDING MACHINE, SHOWN FOR THE FIRST TIME AT THE BRITISH INDUSTRIES FAIR, BY PNEULEC, LIMITED.

ELECTRIC FURNACES.

A new departure is shown on the stand of the Birmingham Corporation Electric Supply Department by Wild-Barfield Electric Furnaces, Limited. It is known as the Wild-Barfield-Foster charge progress recorder which, in addition to controlling the temperature, actually records the progress of the charge itself. The aluminium-alloy foundries are using this type of apparatus which is well worth investigation. Birmingham Electric Furnaces, Limited, also have a range of electric-resistance furnaces in operation on their stand. This type of furnace is rapidly finding a sphere of usefulness in heat-treating castings.

MOULDING MACHINES.

The magnetic moulding machine, which we described in our issue of February 4, is being shown by Pneulec, Limited, of Mafeking Road, Smethwick, Birmingham. At its side is an interesting development of this machine—a rollover, squeeze, strip magnetic moulding machine.

This particular machine will accommodate boxes up to a maximum area of 486 sq. in., and is designated the RSS.486. The design is such that the machine is rolled over before squeezing, and the strip is made on the down stroke, so that only one lot of power is consumed both for squeezing and stripping. The rolling over is done by hand, and the machine is properly balanced so that but little effort is required.

The gravity roll-off conveyor shown in our illustration is arranged so that as the mould is being drawn away from the pattern on the down stroke, just before the squeeze head reaches its lowest position, the turnover board underneath the moulding box comes into contact with the small pieces of gravity roller at the sides of the machine, which are set slightly inclined, and which roll off the mould automatically on to the main conveyor. This main conveyor can, of course, be of any length required.

This is the first time that the magnetic roll-over squeeze strip has been publicly demonstrated, but the machines have been thoroughly tried out under everyday foundry conditions for the last twelve months.

FINISHING AND FETTLING.

With the exception of welding, this section is not so well represented as previously. In the welding section, however, the Quasi-Arc Company, Limited, of 15, Grosvenor Gardens, London, S.W.1, have a new design of petrol-engine driven set. This development will be particularly welcomed by the country foundries, whether at home or abroad, which are not favoured by a cheap reliable supply of electricity. A second Stand, that of Murex, Limited, is also devoted to welding plant.

SERVICE BUREAUX.

Foundrymen should certainly call at the Stands of the Bureau of Information on Nickel and High-Speed Alloys, Limited, to receive the latest information on the ever-expanding field of alloyed cast iron. As a result of this development, what may be termed a veritable new industry is coming into being, and it is the duty of the foundry executive to keep well abreast with the knowledge available.

CASTINGS.

The exhibits by foundry concerns are so numerous that it would be invidious to single out any particular firm for special mention. It is, however, our duty to draw attention to inroads being made by " plastics," under which appellation we include synthetic resin, gum, rubber milk products. The factor which is selling these goods is, nine out of ten times, colour. With the enamelling processes now available to the founders, there often exists a means of competitive retaliation, and this should be borne in mind when touring the exhibition.

Engineering Products.—The firm of Marshall, Sons & Company, Limited, of Gainsborough, have prepared a 32-page well-illustrated brochure illustrating and describing the works and its productions. We were a little disappointed to find that whilst the erecting shops, boiler shops and smithy are illustrated, the foundry is omitted. The list of manufactures, as set out on pages 16 and 17, is particularly fascinating, as it includes such items as tea-preparing machinery, maize shellers, water carts, and steam engines, but we fear the best use has not been made of the typesetter's art. Several pages of the booklet are overcrowded, especially page 11. On the other, page 7 is probably the best laid-out page in the book.

National Federation of Iron and Steel Manufacturers.

ANNUAL DINNER IN LONDON.

The annual dinner of the National Federation of Iron and Steel Manufacturers was held last Thursday at the Hotel Victoria, Northumberland Avenue, Mr. A. J. Grant (President) in the chair. Those present included Mr. J. Henderson (Vice-President); Sir Wm. Clare Lees; Sir James Lithgow; Lord Ednam; Eng. Vice-Admiral Sir R. Skelton; Major-General Sir S. C. Peck; Sir D. Chadwick; Sir Fredk. Mills, M.P.; Sir P. Rylands; Sir R. Hadfield; Sir Chas. Wright; Sir R. A. Pease; Sir B. Blackett; Sir William J. Larke; Mr. J. Craig; Mr. A. Dorman; Mr. A. O. Peech; M. le Comte de Cosse Brissac; Mr. H. Summers.

MR. J. HENDERSON (Vice-President, National Federation of Iron and Steel Manufacturers), proposing "H.M. Government and Parliament," said there had never been an occasion in these post-war years when an industrialist in submitting the toast of H.M. Government and Parliament could have done so without serious reservations and reflections on the fact as to how much smaller his difficulties would have been if industry could have been entirely free from Government interest and interference. For the first time as an industrialist he felt that he could commend this toast without such reservation. The National Government had interpreted the remarkable mandate of a free hand, so far, in a national manner. Although they, who had been doggedly fighting a rearguard action for survival during the past ten years, had suffered disappointment at delay since the position of their industry became daily more critical, they did realise that the change demanded in the fiscal system was not less than a complete revolution to be carried out by a Government consisting of men with conflicting views. They therefore would not repine for the past, but be grateful for the present and more hopeful for the future as a result of the policy that had been so brilliantly formulated and expounded by the Chancellor of the Exchequer and the President of the Board of Trade, Mr. Runciman, who would have been with them that evening to respond to that toast but for the fact that the Chamber of Shipping had, naturally, a prior claim to his attendance.

With regard to the Government policy, while it was obvious that in a complex industry such as theirs there must continually arise problems of detail requiring adjustment, with this reservation as an industry they welcomed the policy of the Government as being a statesmanlike effort to avert the collapse of their industrial economy. This policy by strengthening their own industries should enable them to exercise a beneficient influence, through international action, on the economic recovery of the world. No useful purpose could be served by meticulous examination of the potentialities of Government policy in its present state of development, rather should it be envisaged as a broad general policy, through which could be created a healthy and prosperous industrial economy in this country. Industry, as a whole, should, therefore, approach the problems presented by this policy with the wholehearted intention of collaborating with H.M. Government in adjusting difficulties in the broadest possible spirit of patriotic endeavour.

Need for Broad View in Protection.

It could not (continued the speaker) be too strongly emphasised that in the natural desire to protect the interests of individual industries, even the industry concerned must bear in mind the axiom that it could not be prosperous in a bankrupt community, and, therefore, its own demands must be conditioned by the effect they might have on the ultimate prosperity of the country as a whole. It was for that reason they regretted the exclusion of even shipbuilding from the operation of the Bill; if the confidence they were asked to place in the Advisory Committee was justified, there could be no reason to exempt any industry from their purview.

While they, as an industry, had set before them an ideal of endeavour to adjust their own desires to ensure the benefit of the industry considered as a national unit, industries in turn as units must endeavour to develop a national outlook and ensure that policies which they devised for their own protection were consistent with the attainment of national prosperity. It was in that spirit that they approached the Government proposals, and would hope to collaborate in making them rapidly effective, for he was not exaggerating when he said that immediate and effective action was imperative if the iron and steel industry was to recover.

One point they would wish to emphasise: no industry had, perhaps, suffered more from external criticism and advice as to how it should be reorganised and its productive efficiency improved, almost invariably from those who were not engaged in the industry, and who, from the nature of their criticism, obviously had little technological knowledge. What was needed was almost exactly what H.M. Government was endeavouring to achieve—a reduction of the burdens of taxation which had increased with every successive Government in the post-war period, and the creation of conditions within which industry, by the operation of ordinary evolutionary forces, could freely develop in the form best calculated to secure its expansion under the conditions obtaining.

SIR FREDERICK MILLS, BT., M.P., responding to the toast, remarked that the present tariff Bill was the outcome of long years of spade work. From the bygone days of protection, the full circle of Free Trade had been completed, and now they had a Government who were prepared to protect the country from unfair foreign competition.

The Iron and Steel Industry.

SIR WILLIAM CLARE LEES, O.B.E., J.P. (President of the Association of British Chambers of Commerce), proposing "The Iron and Steel Industry," said that year by year the home market had been invaded by an ever-increasing volume of imports of iron and steel, some of which had been thrown upon that market at prices admittedly far below the cost of production. That was not fair competition; it was economic warfare. It must cease, and presumably, under their new fiscal system, it would cease. Many beneficial results might be expected to flow from the possession of a secure home market. Employment would increase. The call upon the unemployment fund would diminish, bringing relief to the Exchequer and work to the unemployed simultaneously. The consumption of coal would be greater, bringing similar advantages to those engaged in the coal-mining industry. The increased purchasing power so created would filter through into every avenue of trade.

In a word of warning, the speaker said the basic industries of this country were suffering from something akin to war weariness. The fight had lasted so long. The odds had been so great. They had been ground between the upper and nether millstones of a rigid industrial system and an equally rigid monetary standard in a world of rapidly-shrinking values. It had been impossible to equate their costs to world prices. It might be that some might be tempted to turn with a sigh of relief to a protected home market and relax the struggle for overseas trade. Such a policy would be disastrous to our national interests. The great and overwhelming need at the present time was a large and immediate increase in the physical volume of the exports from this country.

It was true that in the iron and steel trade the bulk of the raw material required would be produced at home, but with that exception every industry one revived would need raw material from abroad. The increased purchasing power of the men and women brought into employment would be largely spent on food and clothing, the raw materials of which would have to come from abroad. The increased purchases could only be paid for by an increase in the volume of exports. The nation had decided that the home market should be reserved in a large measure to home producers. That was a privilege which in their case carried great responsibilities. Not merely the standard of living, but the very existence of their people depended on the maintenance and expansion of the export trade.

Low-Price Steel.

Referring to one aspect of the steel trade which had impressed him abroad the speaker said the heavy industries did not lend themselves to popular advertisement. The most telling advertisement was price. Some of their Continental competitors catered for low-price markets with Bessemer steel. He was aware that in touching upon that he was in the presence of the most difficult of subjects—that of British standards; but with great respect he would remind his hearers that countries which had adopted and were satisfied with standards somewhat lower than those which had been established in this country were not in the least likely to change their standards to please us. One might be prepared to do without this business, though he was speaking of markets which were likely to develop over the next fifty years more rapidly than any other part of the world. But the mere fact that they did not offer what was wanted and that what they did offer was dearer than what was bought was a bad national advertisement. It created the impression that Great Britain was a dear market and had its repercussions in its effect on other ancillary trades.

MR. A. J. GRANT (President of the National Federation of Iron and Steel Manufacturers), replying, said they welcomed now the dawn of a new era with a Government pledged to a national industrial policy, and it was fitting that the iron and steel industry should give some indication of its hopes and aspirations under conditions which would enable it to take the requisite steps for its own rehabilitation. Co-operation, not competition, was the dominant principle of the industry's policy. In the development of new uses for iron and steel the Steelwork Association was making encouraging progress; the Export Association, in the development of export trade for certain products, had had considerable success, and in view of the Conference at Ottawa it was interesting to note that they had made great progress in the Canadian market. But there were many other markets to conquer when economic conditions improved. Co-operation with consumers in the development of the export market, to the mutual advantage of the producing and using industries, had made considerable progress. Agreements in this connection were well known to exist with shipbuilders, structural engineers, re-rollers of all kinds, involving a number of different industries. These agreements were capable of much greater development beyond the stage they had already reached, but they promised, as a result of the experience already obtained, the possibility of considerable development with a still wider circle of using industries.

Co-operation in Domestic Market.

Co-operation in the domestic market and the regulation of supply to demand, the general improvement of productive efficiency by the segregation of products to those areas and works where conditions permitted of the most efficient production, having due regard to geographical relation to consuming markets, was another sphere in which the industry was actively developing a policy which must increase its power of competition. With regard to the Empire a policy of co-operation with the iron and steel industries already established in the Empire overseas had been adopted by the British industry for some years. A considerable advance in the development of this policy had been made even under the very difficult conditions of the past year. They welcomed the membership to the Federation of the Tata Iron & Steel Company of India and the Broken Hill Proprietary Company of Australia, and every iron and steel producer throughout the Empire had been invited to take up membership so that close co-operation might be established in technical, statistical and commercial policies; and finally, co-operation internationally with the iron and steel industries of the world in order that production and demand might be so correlated as to ensure that the industries in the different countries might be operated as efficiently as conditions obtaining in each country might permit.

Foreign Competition.

Referring to foreign competition in this country, the speaker said the sale of products in this market at prices far below the cost of production in the country of origin, if persisted in, could only ruin the industries of this country, and by thus reducing their purchasing power, actually destroy the markets of those who had adopted the policy for the purpose of increasing them—in other words, their effort for survival must result in ultimate suicide. The consumption of iron and steel products in the world was only to a very limited extent dependent upon a low price level and was certainly not stimulated by a continually falling price level.

Sand Testing in the Foundry.

DISCUSSION BY SCOTTISH FOUNDRYMEN.

Mr. Buchanan's Paper, which has appeared in our last two issues, is the most important contribution to the study of foundry sands which has appeared in recent times. In the discussion which followed, the salient points of which are set out below, the question of the hardness of rammed moulds was, rightly, particularly prominent.

The CHAIRMAN (Mr. N. McManus, M.B.E.), in introducing Mr. Buchanan, said the question of sand selection and preparation had not received so much attention in British foundries as had been given to it in America. There had, however, been an improvement in recent years, and foundrymen had realised the necessity of giving more attention to sand problems. He thought that the first real study in Britain was by Prof. Boswell, who, at the instance of the Ministry of Munitions, had investigated the available British sands. Mr. F. Hudson had investigated Scottish moulding sands, and Mr. Oliver Smalley had also done much work on British sands. At the conclusion, he said that they had listened to an excellent Paper, and he thought that they were all very indebted to Mr. Buchanan and should express their appreciation of his efforts to produce the Paper. The time devoted to the work and preparation of the graphs, etc., must have been very great. They had been given an enormous amount of data, and it was somewhat difficult to appreciate them all simply by listening to them. They would appreciate them better when they saw them in print. He felt sure that there were a number of points which they would like elucidated and many questions to be addressed to Mr. Buchanan, which he felt sure the author would be only too pleased to answer.

Sieve Tests.

MR. D. SHARPE said that after all the multitude of figures which had been put before them, it might appear rather impertinent to ask for more, but he would like to ask Mr. Buchanan to give them the results of sieve tests on the sands which had been dealt with, not perhaps in great detail, but specially in regard to the amount of fines. He personally put great stress on the proportion of fines in a moulding sand.

MR. BUCHANAN replying to Mr. Sharpe said he was sorry that he had no sieve tests on those sands. He had done a great many sieve tests and in some respects they appeared quite useful, but he had books full of figures for which he never had much use except in the case of sharp sands where it was useful to determine the amount of fines after use or for passing on a complaint to the suppliers. He had a certain amount of difficulty in regard to screening tests because there seemed to be so many different screens that it was difficult to know which to use. He really could not add anything useful on sieve tests.

Permeability Tests.

MR. F. HUDSON said that he thought Mr. Buchanan was to be congratulated upon the excellent Paper he had produced and the very careful manner in which he had gone into the sand question in the foundry with which he was connected. He had been specially interested in the author's remarks regarding the permeability testing by the British Cast Iron Research Association's apparatus and the difficulties of obtaining reliable results. He himself could confirm what Mr. Buchanan had said about the unsatisfactory tests on hand-rammed cores. He had not been familiar with the Research Association's apparatus chiefly because he had worked with his own apparatus for a good many years, but about two months ago he thought it would be as well that he should become familiar with the Cast Iron Association's apparatus and purchased a set with the object of comparing the results with those obtained with his own apparatus. He regretted that he had been unable to obtain any reliable results with the Association apparatus. Mr. Buchanan's figures confirmed his own experience and showed the absolute unreliability of the British Cast Iron Association testing apparatus. He had had an assistant doing nothing but sands for more than a month and he could get no results at all with hand ramming, the variations were from 71 to 108 with a density of 1.6 and 149 to 186 with a density of 1.7. He thought Mr. Buchanan's Paper would be of real value to anybody attempting to use the British Cast Iron Association apparatus. He would like to ask Mr. Buchanan about the permeability of dry sand, the method and the modification. In making tests with his own apparatus he had found a great difference in permeability between the sand green and after drying. Was there any possibility of a leakage between the cylinder and the core after it had been returned to the tube? He rather thought there was such a possibility. He thought Mr. Buchanan might give an opinion as to the use of coal gas for testing permeability. His experience had been that from the time the gas was turned on and the production of a steady burning flame there were one or two explosions and the explosions must form a vacuum in the top part of the container. If Mr. Buchanan gave them his opinion on these points he thought it would greatly increase the value of the Paper.

MR. BUCHANAN replied regarding the difference between the sand for dry-sand testing green and dry, and the possibility of a space being left between the core and the sides of the cylinder and allowing gas to pass that had been kept in mind, in fact it was the first thing to look for. His first tests were done by rapping and as far as he was aware there was no escape of gas up the sides. Every precaution was taken in checking. If the sand was very much more permeable in the dry state there should be a great reduction in the time the gas took to pass through. As both were much the same, there could be no escape, if there was they would have a lower time.

MR. HUDSON said he found that the permeability was greater after drying in the ratio of 100 to 150.

MR. BUCHANAN: Did you find a change in volume?

MR. HUDSON: Oh, yes.

MR. BUCHANAN said the tests he did showed hardly any change in volume.

MR. HUDSON: Was moisture condition constant?

MR. BUCHANAN said it was; hence he used a calibrated spring. He thought that any slight change of volume would be shown very clearly by the length of the core. The taper on the core was very slight and a small change in volume should produce a considerable movement in the cylinder. A great deal more investigation was needed and the results which he had given were not very old. He had no doubt that in the near future a better apparatus would be devised.

MR. A. LAWRIE said that he had been exceedingly interested in the Paper, but there had been so many figures and diagrams given that he had not been able to assimilate them. He had, however, gathered one or two impressions. Regarding the proportions of the sands given by Mr. Buchanan, he would like to point out that floor sand was not a standard material and it all depended on the composition of the floor sand what proportion of rock sand was added. As the sand deteriorated the rock sand had to be increased. It might be that 40 to 45 tons of floor sand were used to 1 ton of rock sand, according to the work done. The floor sand in his foundry was a very different material from the floor sand in Mirrlees Watson's foundry. With regard to the variation of permeability due to ramming, he thought that was bound to occur unless they worked to a standard length. He would expect that one end of the core would be more dense than the other and the permeability figure would be that of the denser end. If rammed from both ends the core was liable to be softer and more permeable in the middle. Regarding dry sand and the relative permeability in green and dry state, the core should be more permeable in the dry state. In the old days the usual test for permeability was to dry the core and weigh it, then immerse it in water until saturated and then reweigh. The weight of water absorbed gave a working idea of the permeability. He thought that on the whole Mr. Buchanan had broken new ground. In the old days founders got on very well without the need for so much testing, and he was inclined to think that in those days better work was done than now. He was, however, very pleased that it should all come about for the good of the industry.

MR. BUCHANAN said that the whole aim of the work done for the Paper was to show that sand testing was not necessarily a highly scientific operation, but that it could be made a mechanical thing which any two persons could do and get the same results. As to the query whether sand testing would benefit the industry, he would mention that the sand they made in their foundry in the mill described was used for all classes of castings made by the firm from small couplings to bed plates 25 ft. long in dry sand, covers for evaporator ends, 8 ft. dia. swept in green sand. All those were made with one sand mixture. Of course, for one class the mixture gave very good results and others not quite so good. The mixture he had mentioned did not give quite such good results with light castings as with heavy ones. They could not make a sand for each class of castings, it would take up too much time. The whole object of the tests he had made was to find a type of sand which could be used for all the work in their foundry. Regarding Mr. Lawrie's reference to floor sand, no doubt it was anything but uniform. Although it might vary greatly, it would be fairly uniform after milling. The adjustment of the floor sand was the whole object of sand testing. If there was no testing method, the moulder played for safety and added more rock sand than was necessary. Regarding variations in the test-piece, he took pains to verify it before putting the matter to Dr. Skerl, and many of the points which he had put forward were in answer to his criticism. Then if one part of the compression test-piece was soft all the tests were the same, and results comparable and quite useful. If the test-pieces were made as he had suggested there would be no variations. Regarding permeability of the cores, since they were not used for strength testing, the necessity for uniformity was not so great. The appearance of the cores were much superior to anything he could produce by hand ramming.

Sand Testing and Economies.

The CHAIRMAN said that they were pleased to welcome Mr. Semple, one of the directors of Mr. Buchanan's firm, and he thought they would be pleased to hear what that gentleman thought of the results obtained from Mr. Buchanan's work.

MR. D. SEMPLE said that he really had not enough knowledge to talk to a body of foundrymen about sand testing. It was really so short a time since they took up the work on sand preparation that it was very difficult to say much. He thought Mr. Buchanan had produced very good results and a distinct economy. Since adopting the milling and mixing process they had effected a very large reduction of repair work on

(*Concluded on page* 133.)

Some Practical Notes on Oil-Sand Practice.*

By H. W. Keeble.

During these post-war years the boundaries of core-making have continually been extending. This position has come about by the increasing intricacy of the internal arrangement of castings and the tendency towards the simple external or shell design. Undoubtedly the future will witness a greater use of cores in mould construction if this type of design continues to be developed.

Cores are made in green and dry sand and in strickled and swept loam sands. For large work the loam and dry-sand type of core will always remain supreme, but in smaller castings of complicated structure, the use of oil-sand cores is definitely and economically beneficial. Drastic competition dictates that machining costs must be reduced. In turn, this demand is passed on to the foundry for the supply of castings carrying a minimum excess of metal which, when removed, ensures sound castings. Especially is this the case in small precision work where the castings are machined by the use of jigs. Any excess over that allowed for greatly increases the machining costs.

These conditions are met by the use of oil-sand cores. Oil-sand cores are not a cure-all, and in cases where cores of this type are of small cross-section and are surrounded by large masses of metal, their use is to be avoided. For the heat from the metal will completely burn out the binder, and the core will collapse and a solid agglomeration of sand and metal will result. The utility of oil-sand cores is limited to their capacity of holding sufficient bonding oil for its own support until after a solid skin of metal surrounds it.

The use of oil-sand cores offers the following advantages:—(1) They need less core irons and are more rigid under metal pressure; (2) use of chaplets may be lessened with the avoidance of their inherent trouble; (3) they crush easily after casting, avoiding the setting up of contraction strains and facilitating fettling; (4) far less artificial venting is necessary, thus saving time in core-making and losses through blow-holes and scabs; (5) small volume change during drying and ease of handling; and (6) cores may be kept in stock without fear of deterioration.

Further, on some castings such as water-cooled quadruplex air-compressor casings, as many as thirty or more separately-made cores may be necessary to form the complete core, and, when fitting the cores together, considerable handling and rubbing down is usually necessary. The use of oil-sand cores considerably aids and simplifies the core-making on such work. The richness of oil-sand mixtures may be adjusted to meet the requirements of their particular application. On jobs such as that mentioned very strong cores with sharp edges are required in contrast with those cores used in the straight mass production of pipe fittings, etc. Four per cent. of oil may be considered representative of the former class of cores, whilst 2½ per cent. is characteristic of the latter type.

Raw Materials for Oil-Sand Cores.

Oil sand consists essentially of pure silica sand mixed with a varying percentage of oil binder, which just holds the grains together by a covering of non-volatilised oil. Various factors govern the suitability of both sand and binder to be incorporated in the mixture, and these will be considered in turn.

Moulding sand comprises silica-sand grains around which a thin pellicle of clay bond tenaciously adheres, and a core sand is simply the silica grains of a moulding sand, minus the clay envelope. Generally, core sands are coarser in texture than that of moulding sands, but this depends and varies according to the locality from which the sand is obtained. The ideal core sand should possess silica grains of uniform spherical size with an entire absence of silt. In practice these conditions are never obtained, and usually the sand contains only up to 80 per cent. of one grain size and a silt content of up to 5 per cent. and over. The higher the percentage of predominating grain size the better the sand. The smaller particles of fine sand (which are usually angular) and silt pack in the interstices of the larger grains and block the interstitial passages, thus reducing permeability and increasing the liability of the core to blow or scab. As cores are often completely surrounded by molten metal and the expanded air and generated hydrocarbon gases from the binder must pass through the sand, the question of permeability must receive careful attention. The finer the predominating grain size the smoother the casting skin becomes and the more important the silt content, as the interstitial passages, being smaller, are easily blocked and permeability is reduced, in addition to the effect of greater grain surface area exposed, causing increased frictional resistance to the gas flow. In addition to the effect on permeability, fine grains of sand lend themselves more open to attack by alkali oxides and lime and magnesia, etc., lowering the refractoriness by the formation of fusible silicates, than do coarse-grained sands. This slag formation results in the trouble of "burning on" and rough-surfaced castings. For refractoriness a coarse sand is desirable. Fine sands possess the advantage that blacking may be eliminated, whilst with coarse sands liberal coatings of blacking are necessary to prevent the metal penetrating between the grain junctions, imparting a roughened surface to the casting. If much rubbing down has to be carried out on a coarse-grained core an irregular surface is the result, for the large grains tear the core skin. With a coarse sand the points of contact per cub. in are many less than those of a fine sand. Hence coarse-grained cores are weaker than fine-grained cores, under comparative conditions.

Silt is objectionable in core sand as it lowers the permeability, absorbs quantities of the binding medium without imparting any strength, tends to cause crumbling in the finished core and lowers the refractoriness of the sand, because the silt carries most of the slag-forming material. From the point of view of texture, lead shot illustrates a first-class core sand, whilst nickel shot with its varying globule size is characteristic of a bad core sand.

River, sea, dune and pit silica sands are all used in oil-sand practice. Sands of the river and sea type are liable to contain minute particles of shell and limestone and organic matter, all of which evolve gas when in contact with molten metal. Dune sand generally possesses better rounded grains than sea sand, because wind friction is more severe than sea washing in reducing the angular points on the sand grains. Such sands are usually designated by the old-time foundryman as being "sharp," but this term is misleading. Table I shows the grading of some silica core sands, whilst photomicrographs of these sands are shown in Figs. 1 to 4. It is worthy of note that in each case, with the exception of the Martell sand, the predominence of one grade amounts to over 70 per cent. of the total. The Stowmarket sand is a grade of sand finer than either the Curtis or Leighton Buzzard and gives very smooth-surfaced castings without the application of blacking. The tendency for two distinct grain sizes to be present is not advantageous. For jobbing work generally, in high-class castings, Leighton Buzzard is eminently suitable, and from experience gives excellent results. At Stowmarket, a sand of similar grade to Leighton Buzzard is now being

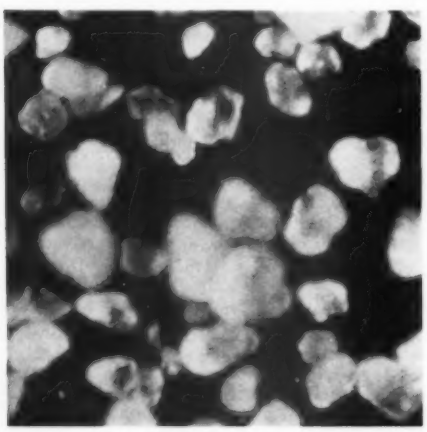


Fig. 1.—Ardleigh Silica Core Sand, containing Two Predominating Grain Sizes to the Extent of 53.0 and 36.8 per cent. × 25 dias.

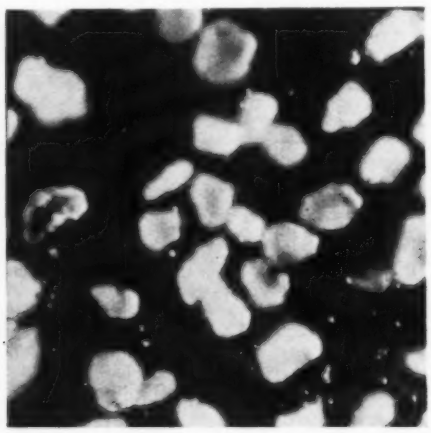


Fig. 2.—Stowmarket Silica Core Sand, containing 78.7 per cent. of One Grain Size. × 25 dias.

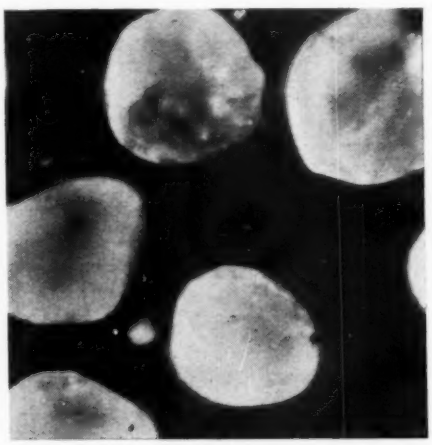


Fig. 3.—Curtis Silica Core Sand, containing 75.0 per cent. of One Grain Size. Note Spherical-shaped Grains. × 25 dias.

* A Paper prepared for presentation to the London Junior Section of the Institute of British Foundrymen.

quarried. The choice of a core sand must be influenced by the type of work in hand and freightage costs to the foundry.

The core binders which are introduced are multifarious in kind, and give multifarious results. Core media include a wide variety of materials, but those generally recognised may be classed into the following categories:—(1) Oils of vegetable and mineral (and sometimes fish) origin: (2) cereal binders, including wheat, potato, dextrine and starch binders; (3) colloid types, comprising glucose, molasses and sulphite lees; and (4) gums, resin, etc.

Linseed oil is by common acceptation the ideal binder for strength, and it is the basis of most proprietary oils. It suffers from the great disadvantages that its green bond strength is practically nil and that linseed-oil-bonded sand tends to stick to the coreboxes, demanding greater care by the coremaker in withdrawing the cores. The addition of a little paraffin or fuel oil considerably minimises this difficulty. Alternatively, the coreboxes may be lightly brushed with these oils before the sand is tucked in. Linseed-oil cores require a little longer time in baking and a temperature of 270 deg. C. for maximum strength development. The production of the bond is essentially a chemical reaction in which oxygen is absorbed, and a tough elastic film covers and connects the sand grains. Boiled linseed oil is frequently recommended, but the boiling process causes it to absorb oxygen, thus increasing the viscosity and causing it to thicken, giving greater trouble in the mixing of the sand and oil. Mineral oils are used to thin down the vegetable type of oils. Fish oils are objectionable on account of their ejection of acrid gases, when the oil is being burned out.

Cereal binders consist mostly of rye, wheat and potato flour, the bonding constituent of which is gluten and starch. The gluten material is unstable, absorbs moisture and rapidly deteriorates. Binders of this category have to be mixed in with the sand, the cores baked and used immediately the binder is made up. Cereal binders are cheap and impart a good green bond to the core. The principal disadvantage of this group is that they are readily acted upon by moisture, and the cores cannot be placed in green-sand moulds unless the moulds are to be poured immediately. The cereal type of binder is extensively used in America.

The colloid section of binders comprises glucose, molasses (a by-product in sugar manufacture), etc., which are soluble in water. Also sulphite lees from paper-pulp manufacture which are aqueous solutions of the resinous products of the wood used, is included in this section. Sulphite-liquor cores have the valuable property of being harder and firmer at the surface than at the centre of the core. Cores of this type are especially suited to those cases where it is essential that the cored-out sections should be particularly accurate in their relationship to the final dimensions. Molasses give off very little gas on casting, but produce cores of variable strength owing to the action of fermentation.

The use of resins, etc., as core binders demands the institution of strict control, as any overlapping of the definite temperature range causes burning of the binder and loss of strength to the core. After cores of this class have been heated to a certain temperature the binder becomes thin and tends to run to the core base whilst a portion evaporates.

Most commercial binders consist of a blend of these various examples of binders with linseed oil as a base. Because of the various assortment of core binding media arrayed before the foundryman, the selection of any one to give the strongest cores consistent with price, becomes a bewildering proposition. An ideal core binder should possess the following properties:—(1) Be moisture proof; (2) cores be strong enough to resist metal wash; (3) easily mixed with the sand; (4) must not adhere to coreboxes, and (5) gas volume given off on casting must be low.

The conclusions reached by V. Crossby* contain some pregnant facts which ought to be remembered when consideration is being given to the choice of a binder. He says (1) commercial core oils are prepared from so many different drying oils and other materials having various chemical and physical properties, that it is impossible to establish the value of the oil as a core binder on the basis of any chemical or physical property of the oil; (2) the bonding property of core oils may be determined accurately by making test cores in a uniform manner, baking these cores under definite conditions and measuring the transverse strength of the cores; (3) the economic use of a specific core oil is possible only when the characteristics of that oil are known and the baking practice is controlled so that the maximum effect of the oil is obtained.

When comparing strength figures of binders against linseed oil (usually taken as a standard), notice should be taken of the drying temperatures, for not until the critical drying temperature of linseed is reached is the maximum strength developed, and tests ignoring this fact may be very misleading. Further, it should be remembered that most binders are sold by weight whilst usually they are used by volume measure. This fact may make one binder ultimately cheaper than another, although the primary cost may be higher.

Undoubtedly the day is not far distant when all core sand will be bought, not by name or reputation, but to a grading specification, and the binder guaranteed to produce cores of strength properties which lie between predetermined limits. Where cores are made by unskilled labour, as in mass production systems, first-class materials are essential in order to compensate for the lack of skill in the manipulation of cheaper materials which could be used by a skilled coremaker.

In order to set coremaking practice on a scientific basis and obtain consistent results, all core sands should be dried before use. Fine sand can carry a greater percentage of moisture than coarse sand without it feeling any wetter to the touch. This is because the water is present as a film around the grains, and owing to the larger surface area of the fine sand grains more moisture is necessary to cover them with the same degree of moistness. Similarly, this condition is representative of that which obtains when the binder is added. A coarse sand needs less binder than does a fine sand to develop a given strength.

* "Transactions," A.F.A., vol. 33, page 73.

TABLE I.—*Showing Grade Analysis of Various Core Sands.*

Grading.		Origin of sand.			
Sieve mesh size.	Grain size in mms.	Martell, Ardleigh.	Stowmarket, Suffolk.	Curtis, Cambridge.	Leighton Buzzard.
		Per cent.	Per cent.	Per cent.	Per cent.
On 30 mesh	0.85	1.6	—	22.8	18.5
30 to 60	0.425	53.0	3.5	75.0	71.6
60 to 90	0.28	36.8	78.7	2.2	7.1
90 to 100	0.25	8.4	10.8	—	1.8
Passed through 100 ..	Less than 0.25	—	7.0	—	—

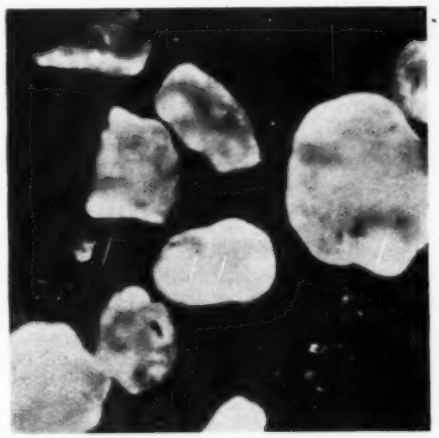


FIG. 4.—LEIGHTON BUZZARD SILICA CORE SAND, CONTAINING 71.6 PER CENT. OF ONE GRAIN SIZE. × 25 DIAS.

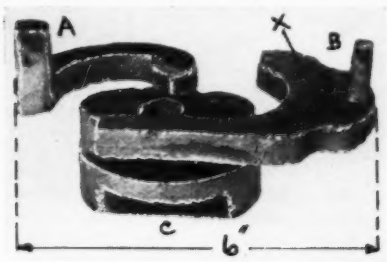


FIG. 5.—CORE FOR OIL-PUMP CASING, MADE IN THREE PARTS, FITTED TOGETHER.

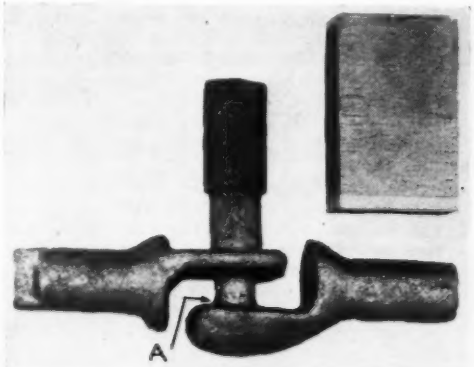


FIG. 6.—VALVE BODY CORE (COMPARED IN SIZE WITH MATCHBOX), THE WEAKEST POINT BEING AT A.

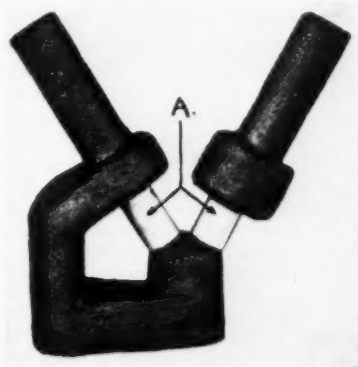


FIG. 7.—CORE FOR HIGH-PRESSURE COVER HEAD. CHILLS ARE INCORPORATED AT A.

In large foundries where oil-sand practice is extensive, rotary sand driers are employed. These machines consist of a rotating drum through which the sand slowly passes. An exhaust fan at the wet-sand inlet end draws hot gases off the firebox (usually burning coke) which is situated at the dry-sand exit. The sand is continually exposed to the hot products of combustion and it leaves the drier at the hottest point—next the firebox. The dried sand passes

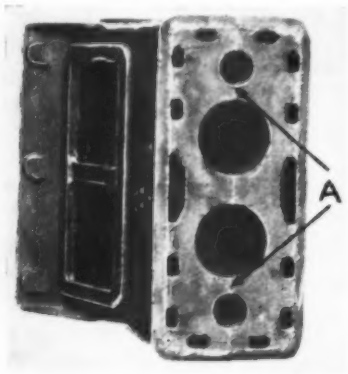


Fig. 8. — Water-cooled Air-Compressor Cylinder Block. Metal Thickness increases 67 per cent. at A.

down a shute and is riddled and the core sand bagged or used. An even flow of wet sand into the dryer is ensured by a spiral screw the speed of which is adjusted according to the machine capacity and the sand moisture content.

Where the use of an oil-sand dryer is not an economic proposition due to spasmodic requirements or low output of oil-sand cores, the sand may be dried in the core stove, but usually by a little investigation around the works a point may be found where waste heat may be efficiently utilised to dry the sand thoroughly and inexpensively.

Mixing by hand is not to be recommended as the mixture is liable to be heterogeneous in strength, especially if thick binders are used. The paddle type of machine is extensively used for mixing. This machine, horizontal or vertical, gives a kneading and rubbing action which effects even distribution of the binder around the sand grains. In foundries where this machine is not available the mixing must be

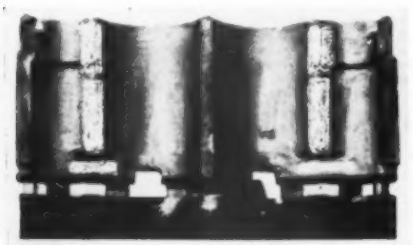


Fig. 9.—Water-jacket Core for Cylinder shown in Fig. 8, showing Chills as Whitened Areas.

done by other methods. Oil sand cannot be efficiently mixed by turning over with a shovel a heap of sand containing a pool of binder. In such cases the ordinary pan mill may be used to advantage. The mullers should be free to ride over the sand and possess adequate scrapers to turn over the sand. At the close of the day's mixing of the normal moulding sand, any adhering coatings of damp sand should be cleaned out, or brushed out when dry in the morning. The oil-sand mixture may be mixed in the same way as a moulding sand, the time necessary for proper mixing being found by experiment. Particular attention should be given to avoid the mixing of oil sand in between batches of ordinary mounding sand, as the latter, usually being of finer texture, will affect the permeability of the core sand even if small amounts are incorporated in with it. Oil sand is best stored in concrete or sheet-metal bins and covered with a damp sack.

Examples of Oil-Sand Core Practice.

Coremaking machines have been in existence for the production of the cylindrical type of core for many years and later adaptations and improvements have extended their use considerably. Developments in coremaking machinery have progressed, and to-day a good many types of cores are made by machines which would have been considered an impossibility a decade ago. However, most of the examples to be given are confined to those made by the skilled coremaker.

Fig. 5 is an illustration of a core for an oil-pump casing which was made in three parts. The two arms were fitted in the pedestal by "V" joints and secured by core gum. The prints may be seen at A, B, C. The two arms were reinforced by $\frac{1}{8}$-in. dia. wire bent up into the prints and down into the pedestal block, for if they were roughly handled, fracture would occur in these arms. The black stain seen at X was produced by the wax from off a vent "wire." Owing to the large mass of core on this arm in comparison with the print mass, a good vent passage was necessary for maximum permeability, so a short length of $\frac{1}{8}$-in. wax vent was inserted at this point. The wax vent was not incorporated around the supporting wire

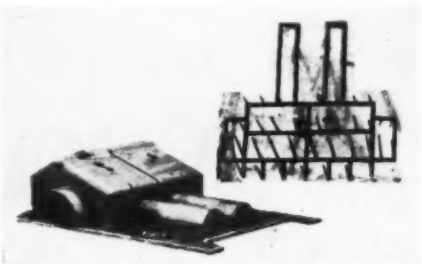


Fig. 10.—Cylinder and Crank-case Core, with Grid, for Cylinder shown in Fig. 8.

because when the wax melted it would leave a space in which the strengthening wire would be loose and the object of its insertion would not be realised. In all cores utilising wax vents the reinforcement rods or wires should be kept apart from the wax vents.

Wax vents are used in cores which cannot be adequately vented by a metal wire. They consist of threads of hemp or jute surrounded by a pliant wax ingredient. On drying of the core the wax melts and percolates throughout the core, leaving a vent hole depending upon the size of the vent string used. Wax vents are very flexible and are useful to "open" a sand core which is complicated, and venting has to be taken around corners and into normally inaccessible pockets.

The overall length of the core illustrated was 6 in. and the average time taken on a batch was 30 min. per core. The chief item in this core manufacture was the bending and fitting of the strengthening wire.

Fig. 6 is an example of a complicated valve-body core. This core was reinforced by the inclusion of three 3-in. moulder's sprigs bent to shape where required. The weakest point of this core may be seen at A. Note the intricacy of the job in the light of the matchbox comparison. These cores were made in batches in an average time of 10 min. per core. The working pressure which these valve bodies had to withstand was 80 lbs. per sq. in.

Frequently in some castings the metal is required to possess liquidity in order that thin sections may run, and at the same time dense-

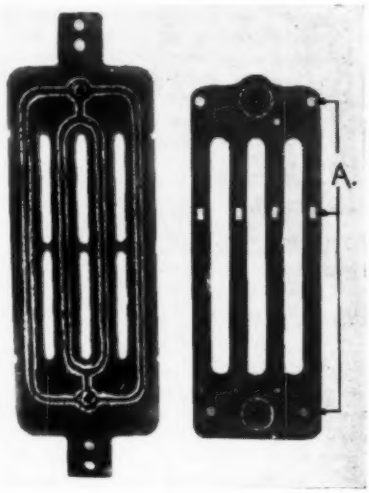


Fig. 11.—Radiator Core, showing Complete Core with Half-core in Metal Box, with Vent Channel Chalked Out. Chaplet Plates are at A.

ness and pressure tightness are essential properties of the resulting casting. Such a case is presented in Fig. 7. This is the core of a high-pressure cylinder-cover head, and these heads are required to function at pressures ranging from 200 to 1,000 lbs. per sq. in. To ensure pressure tightness $\frac{1}{2}$-in. dia. chills were built into the core as at A. The outer chill projected down into the body of the core for strength. The core base was stayed by a wire entwined in its mass. The upper ends of the projecting arms and a portion of the base formed the core prints. Before setting the core in the mould the core chills were smeared with a coating of plumbago and lubricating oil mixed together into a viscous paste. This jacket of grease blacking prevented

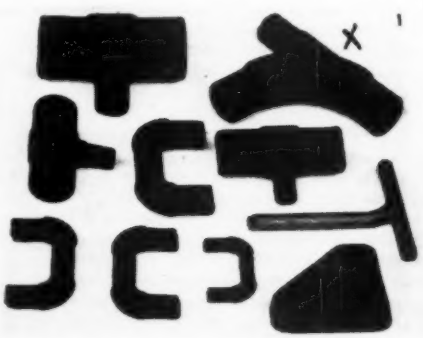


Fig. 12.—Selection of Oil-Sand Pipe Cores. Only Core marked X was reinforced by a Sprig through the Centre.

the chills from burning on and thus facilitated their removal after casting. About half an hour was required to make this core.

Bulbous-section junctions form a prolific cause of "weeping" and leakage which are the chief troubles of pressure-tight casting makers. In Fig. 8, which is a water-cooled air-compressor cylinder-block, at the junction of the walls of the piston-valve cylinders with the main cylinders at A, the metal thickness suddenly increases 67 per cent. This lump of metal holds the heat and

cools more slowly with a tendency towards giving an open fracture. Under the hydraulic test seepage sometimes occurred at this position. The running pressure of this machine is 100 lbs. per sq. in. The trouble was eliminated by the incorporation of ½-in. equilateral chills in the oil-sand water-jacket core. These may be seen in Fig. 9 as whitened areas. It would have been far easier and cheaper to have placed these chills in the round core of the cylinder, but the cylinder had to be machined and with the chill in this core a very hard unmachinable locality would have been made. Consequently, with the chill on the water-jacket side of the cylinder, a chill was obtained which faded off into the desired close-grained and machinable metal on the interior of the cylinder walls with the elimination of porosity. The time taken to build this core was about 2 hours.

Core Grids.

Fig. 10 illustrates the cylinder and crank-case core with the core grid for the casting shown in Fig. 8. Core grids are used to give a backbone to the core, imparting rigidity and enabling the core to be handled. Core grids should not be cast in any dull metal remaining in the ladle or shank but be poured in hot metal so that the grid metal thickness may be reduced and consequently fettling time and costs may be lowered. Nothing is more expensive than trying to remove unnecessarily thick core-grid irons from, say, a jacketed cylinder through water circulation inlets 2 by 1 in. The core of Fig. 10 was made by tucking about an inch of sand around the box without ramming. Then the core grid was embedded in and its position adjusted until it was correctly aligned. Then more sand was added and lightly rammed. Coke breeze was then placed in the body of the core and sprinkled with clay wash. Finally a good layer of sand was packed in and lightly rammed. The core was then turned on to a plate in the usual manner and blackwashed. It was then baked. The time taken to make this core was three hours.

Fig. 11 is an example of oil sand used in modern radiator manufacture. It shows a complete 18-in. core with a half-core in the metal box with the vent channel lightly chalked out. The box equipment includes two half-coreboxes (top and bottom), ventplates and drier shells. The top and bottom boxes are packed with oil sand and then the ventplate is pressed down after being located on the metal corebox by registration pins and receiving holes. The ventplate conforms to the shape of the corebox, and is fitted on the face with a small bead semi-circular (or wide "V") in cross-section, which forms a corresponding indentation in the sand, and thus makes a continuous vent channel throughout the complete half-cores. This method of forming the vent channel is the modern practice, which replaces the custom of scratching a groove in the green or dried half-core by the edge of the trowel. After removal of the vent plate, the two boxes are brought together, face to face, and lightly rapped. One box is removed and the core is then transferred to the drying stove, the other box being used as a drying shell. If a separate drying shell is employed, the second box is removed in like manner to the first, after the fixation of the drying shell. By drying the core in a shell, distortion is reduced to a minimum. It will be noticed that no core gum is used to cement the two halves together; this is accomplished by the coagulation of the adjacent oil films under pressure of the core weight. To procure this action a fairly thin binder is used. The light areas marked A in Fig. 11 are the chaplet plates. It will be seen that these are not placed centrally, but about two-thirds along the length of the core arms.

This is because the radiators are cast on the "bank" to help the metal run along quickly in the thin sections and avoid mis-runs. Consequently, the cores need added support at the lower ends, and this is supplied by the use of chaplets and chaplet plates at the positions indicated.

The strength of these cores may be judged by the fact that the cores for the 36-in. radiators may be held out horizontally from one end without fracture. The weight of the 18-in. metal corebox, which is made of steel, is 8¾ lbs.

Fig. 12 shows a selection of oil-sand pipe cores. These are made without any artificial venting assistance. In jobbing foundries venting is usually overdone, but this is carried out on the principle of "safety first," but in mass production establishments more reliance is placed on the sand permeability, because each core cannot receive the peculiar attention which they do in the former type of foundry. Only core marked X is reinforced, and that by a sprig through the centre. No core gum is used on these cores, the two halves becoming joined in the same way as do the radiator cores.

Other applications of oil sand is in Diesel-engine practice. Water-cooled cylinder heads are made in oil sand supported by light cast-iron grids and vented by wax "wire." The intricacy of these cores is such that wire pricker venting is impossible, and wax venting is the only solution to enable the problem of leading off the generated gases through the prints to be solved.

Very often a combination of oil and dry sand is used. Such a position occurs in the manufacture of some types of heavy cylinders. Here the main body core may be made in the usual way in dry sand and the port and water-jacket cores made in oil sand and assembled on the main core by wiring. For cylindrical water-cooled silencers, oil-sand jacket cores may be used, and the method of reinforcement is interesting. The grid consists of light cast-iron segments wired on to a wrought-iron rod projecting along the core length. Care must be taken in the joining of the half-cores, as a fin is liable to be formed, which is very difficult to remove owing to its internal position.

The preceding examples of the application of oil-sand cores in light, medium and heavy foundry work may be considered as representative practice. The drying of oil-sand cores is a subject by itself and is not considered in this Paper. The main essentials for efficient oil-sand baking are that the time and temperature of the drying period should be adjusted and controlled according to the binder characteristics. Further, heat generation is of secondary importance, whilst an adequate supply of hot air is of every importance. The core benches and core stoves should be arranged so that minimum handling is required to produce the finished cores ready for the moulder.

A thorough knowledge of the principles, technique and possibilities of oil-sand practice will contribute its quota to the economic production of sound castings.

In conclusion, the author would like to record his appreciation of the facilities given by his firm, Messrs. Reavell & Company, and also to Messrs. Shepherd and Richman for their kindness in supplying some of the illustrations.

To prevent lead or solder adhering to steel, coat it with a pasty mixture of whitening and wood alcohol.

Furnace Lining Bonded with Magnesia.—Development of an improved lining for steel melting furnaces, which is claimed to give promise of a much longer life than present linings, has been announced by the U.S. Bureau of Standards. The new lining is composed of electrically sintered magnesia bonded with 20 per cent. water-ground magnesia, and in severe service tests, melting a variety of ferrous alloys in an electric furnace showed a very satisfactory life. Disadvantages resulting from the use of magnesite lining bonded with iron oxide or basic slags high in iron oxide, which have been known to break up through dissolving of the bond in the melt, are said to be overcome by use of the new type of lining.—**Steel.**"

Sand Testing in the Foundry.

(*Concluded from page* 129.)

the moulds. The whole object was to help the production of castings. They were really only at the beginning of the job, and if any of them could offer suggestions for still further advancing the usefulness of the work they would be glad to adopt them.

MR. J. LONGDEN said that he had been greatly interested in the Paper and more especially in the graphs showing permeability. He was not sure that he understood what Mr. Buchanan wanted to convey by the graphs. He noticed that the permeability curve rose with increasing time. When speaking of permeability he was not sure whether the author meant to convey increasing release of gas or the contrary. He could hardly see how there could be an increase of permeability and an increased time. It was interesting to note that 5 per cent. water gave the maximum strength and other properties. He was obliged to Mr. Buchanan for all the valuable data he had given.

MR. BUCHANAN said perhaps he should have explained the graph for permeability a little more fully. The scale showing time in seconds should be read the opposite way. High time means a low permeability and a short time a high permeability, so at first sight the graph appears to be wrong. Milling produces no ill effects unless great pressure is used. The rollers can be allowed to run on the bottom of the pan. The only drawback to milling is that the sand dries slightly quicker in the air. When sand is mixed with the shovel small particles of rock sand the same size as the holes in the riddle are formed, and these contain their own moisture which does not dry off so quickly. In milled sand this excess bonding material is spread over a larger area.

The PRESIDENT said that he would like to say how greatly indebted they were to Mr. Buchanan for the excellent Paper, which contained so much interesting and informative material. They were also indebted to Mr. Hudson for his remarks on hand ramming of the test cores. At his own works they had a Cast Iron Research Association testing apparatus, but had done very little with it on account of the difficulty of getting reliable results, and had put it aside. However, with the lead that had been given by Mr. Buchanan and Mr. Hudson, he hoped they might yet be able to do something with the apparatus. The Paper had been tremendously interesting, but it was so full of charts and figures it was not easy to assimilate it. They would, however, be able to appreciate it better when they saw it in print. He asked them to express in no uncertain manner their thanks to Mr. Buchanan for the trouble he had taken in preparing and presenting the Paper.

MR. BUCHANAN said that he was obliged for the vote of thanks and the kind reception of the Paper. If anything he had said had been helpful or interesting he was very pleased.

Iron and Steel Output in January.

The National Federation of Iron and Steel Manufacturers state that there were 76 furnaces in blast at the end of January, a net increase of 6 compared with the number in blast at the end of December. The production of pig-iron in January amounted to 332,400 tons, compared with 330,600 tons in December and 337,200 tons in January, 1931. Production includes 82,400 tons of hematite, 126,900 tons of basic, 103,100 tons of foundry, and 12,100 tons of forge pig-iron.

The output of steel ingots and castings amounted to 429,700 tons, compared with 425,400 tons in December, and 402,200 tons in January, 1931.

Institute of British Foundrymen.

ANNUAL DINNER OF THE LANCASHIRE BRANCH.

The annual dinner of the Lancashire Branch of the Institute was held on February 6 at the Grand Hotel, Aytoun Street, Manchester, and the number present exceeded all previous records. It was preceded by a whist drive, in which 92 players engaged, and was followed by dancing. At the dinner itself Mr. Roy Stubbs, the Branch-President, was in the chair, and the guests included the President of the Institute (Mr. Andrew Harley), the Vice-President (Mr. V. Stobie), Prof. Dempster Smith, M.B.E., Mr. C. E. Stromeyer (President, Manchester Association of Engineers), Mr. V. C. Faulkner (Past-President of the Institute and Editor of THE FOUNDRY TRADE JOURNAL), Mr. Primrose, Mr. T. Makemson (Secretary of the Institute), Mr. Joseph H. Stubbs, Mr. John Stubbs, Mr. W. Lyon Stubbs, Mr. G. C. Castle (chairman, Sheffield Section) and Mr. Lennox Holt (Director, THE FOUNDRY TRADE JOURNAL). Most of the guests were accompanied by their ladies.

A Close Alliance.

After the toast of "The King" has been honoured, Prof. Dempster Smith gave the toast of "The Institute of British Foundrymen and the Lancashire Branch." He said the invitation to propose this toast was a compliment to the North-Western Branch of the Institution of Mechanical Engineers, of which for the time being he was the chairman. It was very appropriate that foundrymen and engineers should come together in hours of recreation as well as in their work. They were closely allied. Without foundries there would be no engineering. To a mechanical engineer it was very gratifying to observe the attention which foundrymen were now giving to research, not only into metals, but also into the science of materials and all the problems connected with the equipment of modern foundries and the processes employed therein. It gave the engineer hope that the foundry would produce material that he could rely upon. So the engineer was exceedingly pleased with the progress that foundrymen made in research.

Then engineers admired the men who had been chosen to be Presidents of the Institute and of its Branches. It was gratifying to him personally that the President, Mr. Harley, had received his training in the same college as he himself (Mr. Dempster Smith). Then the Branch-President, Mr. Roy Stubbs, received his metallurgical training in the College with which he (Mr. Dempster Smith) was now associated. Like Mr. Harley, he was an energetic man, seeking fresh ideas, not content to carry on with things as they were in the past, but finding new scope for his activities, development in new directions. He was the nephew of two old friends, Mr. Joseph Stubbs and the late Mr. Oliver Stubbs, and was doing in his day what they did in theirs. The Branch would have no occasion to regret that it elected him their chairman.

He was also pleased that the Institute gave attention to education. More and more men were required who had greater skill and capacity than their forbears. He learned from Mr. Harley that an arrangement had been made with the Board of Education and the Institution of Mechanical Engineers to have courses in respect of which a national certificate or diploma would be signed by the President of the Institute. That was a step in the right direction. He hoped the Branch-President would see to it that a scheme of education was produced which would be appropriate to the interests that he represented; the education authorities would certainly give sympathetic consideration to any suggestion that might be brought forward. Amongst the members of the Lancs Branch were experienced men who were competent to pronounce on the type of education required. In that matter no one was better qualified to help, more energetic, tactful and enterprising, than Mr. Makemson, the Secretary of the Institute.

Simplicity of Design Wanted.

MR. ANDREW HARLEY replied to the toast on behalf of the Institute, and said they were all delighted that Prof. Dempster Smith was with them that evening to propose the toast of the Institute and the Branch. He was a brother Scot, trained at the same technical college that he (Mr. Harley) was, and he now occupied a very important position in Manchester, where his influence in education, especially in applied industry, was unique. In the foundry craft technical education had been developed. Outstanding things had been done in the past through accumulation of practical experience, but, after all, science was the shortest way to efficiency. There was no doubt that foundrymen would have to put their house in order. Engineers were making great demands upon the foundry trade. They were increasing the intricacies of the designs, although foundrymen were constantly telling them to simplify the design; and they were constantly demanding that those intricate and difficult castings should pass very special tests and be provided at a cheaper price than ever. That made the foundryman's position very difficult, though, generally speaking, he was meeting those requirements. With regard to price, however, he should not be squeezed to the lowest figure, having regard to what the job was and the finish required. Unfortunately often the order was given to people who had only a vague notion of what the cost would be. Such people did not usually get a second order, but they made the position difficult for other foundrymen. The reputation of a firm, the quality of its products, its capacity to deliver goods at the proper time, were factors which should be taken into account when settling the price.

The Lancashire Branch was the first branch of the Institute to be formed. In membership it was the largest. Evidently it intended to remain the largest. During the past year—a time of great difficulty—the Lancashire Branch distinguished itself by adopting a forward policy and developing a new section in Preston. There was one already in Burnley. Owing to this policy the election of members to the Institute at the last Council meeting was nearly a record, as over 100 were elected.

The Lancashire Branch was very closely identified with some of the most important general activities of the Institute. One of its members, Mr. Jolley, was on the Technical Committee. Everybody ought to support the Committee in its operations. It had an extremely difficult job, but he was sure Mr. Jolley and his colleagues were equal to it.

The CHAIRMAN said he must thank Prof. Dempster Smith for his kind references to himself and his family. His uncle, Mr. Oliver Stubbs, would have been very proud if he could have been present and heard the things said about him.

An industrial Institute worthy of confidence and support was a responsible and vital factor in the industry it represented. Through its collective resources it amassed a vast amount of information and experience from which it must distribute only the best, only that which enabled the industry to produce better products more efficiently and at less cost. The manner in which the Institute performed this important service, the practical value of the information it thus provided for its members, was one of the primary justifications for its existence. For over 25 years such service had been given to the foundry industry by the Institute of British Foundrymen and by the Lancashire Branch in particular. The wealth of practical and technical information which it had distributed had identified the Institute since its inception with almost every major development of foundry practice in Great Britain.

However indispensable and efficient an Institute might be, it could not reach its maximum of effectiveness unless the industry it served had a true appreciation of co-operation. The greater the freedom with which individual knowledge and experience was disseminated through some well-organised medium of co-operative exchange, the sooner would it become of practical value and benefit to the industry as a whole. Foundrymen could not contemplate this thought too seriously. At the back of it lay the reason for the phenomenal growth of some industries and the failure of others to survive. At the back of it lay, too, the reason why the Institute had been of such invaluable service to foundrymen.

Foundrymen's contributions at Branch meetings had added greatly to the store of accurate dependable knowledge required in modern foundry practice. In addition the Lancashire Branch kept in touch with the activities of technical and scientific societies concerned with castings and their uses, and with other branches throughout the country. It was well organised, not only to compile but to distribute the vital facts on the art of metal founding; and through the various Institute publications, annual Conference Papers, the annual "Proceedings" and THE FOUNDRY TRADE JOURNAL foundrymen were continually receiving dependable information to help them in solving their production of foundry problems and improving their products. The potential value of any research was influenced largely by the information possessed by the researcher. That was a significant statement, for it meant that the more information was made available to the technical men of the industry the greater possibilities in their work. The usefulness of the Institute in giving service to the industry thus could be increased in several ways. Firstly, by greater attendance at the meetings, held primarily for the dissemination of information and the interchange of ideas, which offered a fine opportunity for collective knowledge and progress. The greater the attendance, the broader the discussion, and the more benefit for every individual who participated. Secondly, by the greater use of the Institute. Industrial progress was based on intelligent application by the many of the basic experience and data possessed by the few. All research work was subject to improvement as the result of further experiment and discovery. The data accumulated and distributed by the Institute became increasingly important as their adoption or usage by the industry became more general. Thirdly, by increased membership in the Lancashire Branch. Larger membership increased the net income available for expansion, through reduction of costs of distribution. It also increased the annual income available for carrying on the Branch facilities for expanding its activities in general. Increased membership also meant a steady growth in the usefulness of the Branch to the industry, for it implied that more individuals and plants were applying to their own practice the information gathered by the Branch's meetings and representatives. New members brought in new ideas, different points of view, new problems to be solved; all of which added to the value of previously collected material. Efficiency increased through membership. Every foundryman should be constantly looking to the improvement of his methods and practices and the quality of his product. To strengthen his position in that industry he could not stand still. Either he went forward or he would fall behind. Progress would not wait.

No one foundryman possessed within his own organisation alone all the information necessary to his continued success. Co-operation—the interchange of ideas and experience with others in the same field—was the one medium that would bring the needed facts to himself and his staff. Through membership in the Lancashire Branch and the Institute of British Foundrymen the industry received the best material available for improvement of casting practice. Therefore let the foundryman's slogan be "Render good service." Let him keep that ever in mind when at labour and he would be assured of his reward.

Memorial of Mr. Oliver Stubbs.

MR. H. SHERBURN said the introduction of Mr. Oliver Stubbs to the British Foundrymen's Association was that about 20 years ago he attended a dinner on a much more modest scale than the present one. For two or three years he held a kind of watching brief, seeing how the Lancashire Branch behaved, and apparently all was satisfactory, for a year or two later he threw himself into the work with all his vigour and became a member of the General Council of the Institute. From that time he put all his energy and all his business capacity into the work of the Institute. The fruits of his work were seen when the Association was turned into the Institute and a Royal Charter was obtained. Those who were concerned in getting that Charter knew the difficulties that had to be overcome and the valuable work which Mr. Oliver Stubbs did in that matter. To him more than to anyone else was due the appointment of Mr. Tom Makemson as the Secretary of the Institute. Then he went to America, where he cemented the good feelings between the British Institute and the American Foundrymen's Association. So he went on until ill-health laid him aside. The members of the Lancashire Branch now desired Mr. Roy Stubbs to accept a portrait of Mr. Oliver Stubbs as a reminder of the work of their old friend.

The CHAIRMAN said many touching and moving tributes had already been paid to the life and work of Oliver Stubbs by members of the Institute. How fitting this was would be appreciated in proportion as he was known, for he was alien to no one, however humble, who loved the Institute and tried to serve it. He was not of a class, nor of a party. He was of that temperament which sees where all frontiers of class and party fade away in the sincerities of the common life and of good men. The members were now offering the more intimate tribute of regard and affection which was permitted to those who worked assiduously with him in the service of the Institute.

He himself was the pupil of Mr. Oliver Stubbs. For many years Mr. Oliver Stubbs was the kindly and trusted shepherd who guided his feet and directed his mind through the tangled web of life. No one who came to Oliver Stubbs went away disappointed for want of wise guidance and for want of just that knowledge that dared to tell comrades the truth. He helped them with two hands; with one hand he pointed to the ideal for which they must strive, with the other he showed the way by which alone that ideal could be approached. It was clear to him that who wills the end must also will the means, that questions are never settled until they are settled rightly, and that good can never be done by evil methods. So long as the Institute endured, and particularly the Lancashire Branch, so long would his name be built into the story of it, as one who strove to make and keep it clean and fine in structure and in spirit; as one who taught that honour is better than riches; as one who inspired the members to that mutual trust, goodwill and pride which were the foundation of a great Institute. Perhaps his greatest gift was that he could always rejoice in the success of other people and gave encouragement and infused enthusiasm into all with a free hand.

The photograph which had been presented would be hung in the Manchester College of Technology, with the permission of the Principal, to perpetuate the name of Oliver Stubbs for future generations who would behold it and derive inspiration to carry on the great work of the Institute of British Foundrymen.

Presentation to the Chairman and Mrs. R. Stubbs.

MR. R. A. MILES said when Mr. Stubbs became President of the Branch, last year, he was a bachelor; he was now a married man, and the members of the Lancashire Branch desired to give to him and to his Mrs. Stubbs a token of their sincere regard. The token was a silver tray inscribed: "Institute of British Foundrymen. Lancashire Branch. Presented to Mrs. and Mrs. Roy Stubbs by the members of the Branch as a token of esteem and regard to commemorate their marriage, February 21, 1931."

In replying, MRS. STUBBS remarked that whatever work her husband undertook, he did thoroughly, and he must rejoice in it. In future it would be her part to encourage him in his work for the Lancashire Branch.

Diploma for Mr. F. Harris.

Mr. Harley presented to Mr. F. Harris, of Padiham, the diploma of the Institute, in respect of his Paper upon the manufacture of light castings read before the Burnley Section. MR. HARLEY said the award proved that the Paper was well above average merit. Mr. Harris must have spent many hours in study preparing this Paper, and he had conveyed a great deal of useful knowledge to his fellow-members.

MR. HARRIS replied that when he set out to write the Paper, he did not anticipate the reward.

Notes from I.B.F. Branches.

London.—At a meeting of the Council of the London Branch, held last Thursday, Mr. H. G. Sommerfield was nominated President in the place of the late Mr. H. C. Dews, and Mr. H. W. Lockwood, of Stewarts & Lloyds, Winchester House, Old Broad Street, London, E.C.2, was nominated honorary secretary. During the evening the following letter was read from a member in South Africa:—

"To the President, Officers and Members,
Institute of British Foundrymen,
London Branch.

"SIRS,—Perhaps you will all be very interested to receive a greeting by the first air mail from the Cape to London as a memento of one of its members in South Africa. I hope that this will come to hand quite safely, and, through the air-mail service, we here in South Africa will be brought into closer touch with the home country. As an Englishman by birth and a member of the Institute, I wish to extend my best wishes to you all, and trust that a bright future is in store for us all for 1932.—Yours, etc.,

"F. H. C. ORAM,
"Member.

"c/o Natal Estates, Limited,
Mount Edgecombe,
Natal, South Africa."
"January 21, 1932."

Burnley.—MR. BEN HIRD, of Monmouth, was the lecturer at the last meeting of the Burnley Section of the Institute of British Foundrymen, held in the Municipal College on February 12. He took for his subject "Black Sands," and by means of lantern slides showed the effect of hand and mechanical mixing, gas content, composition and microstructure, and concluded with a description of various types of sand-testing machines. He was accorded a vote of thanks on the proposition of MR. TAYLOR, seconded by MR. LOWE. After an acknowledgment, a short discussion was initiated by MR. JACKSON.

Chromium Plating.

In the course of an article on "The Status of Chromium Plating," by DR. WM. BLUM, published in the "Journal of the Franklin Institute," it is pointed out that practically all commercial chromium plating is conducted from solutions of chromic acid containing a small amount of a sulphate. The concentration of CrO_3 is usually from 33 to 55 ozs. per gall., and the ratio of CrO_3/SO_4 is from 100 to 200. The baths are generally operated at somewhat elevated temperatures, for example 45 deg. C., and at relatively high current densities, such as 100 to 150 amps. per sq. ft. (10 to 15 amp./dm².). Owing to the hardness of chromium, it is more difficult to buff than nickel and most other metals. Hence it is desirable to produce bright deposits of chromium that will not require buffing. Various researches have shown that for a given composition of solution, there is a limited range of temperature and current density within which bright deposits can be produced.

At any given temperature the character of deposit and also the cathode efficiency vary with the current density. On irregularly-shaped articles, the current density is never uniform. Consequently in plating such articles it is difficult to obtain a bright deposit over the entire surface, and the coating on the recessed part may be very thin or entirely lacking. This poor "throwing power" is a decided handicap, and has taxed the patience of those engaged in commercial chromium plating. Practically, it has been overcome more by ingenuity than by scientific research. The best results are obtained by expedients that make the cathodes current density more uniform, for example by (1) increasing the distance between anodes and cathodes, (2) using parallel, concentric or auxiliary anodes, (3) attaching to the cathode a wire which acts as a "thief" and detracts the current from points tending to have excessive current densities, or (4) using non-conducting shields to reduce excessive current densities. In general any condition that will make the cathode efficiencies more nearly equal with a change in current density will improve the throwing power.

Unlike most other plating, this process employs insoluble anodes, usually of lead or iron. The former metal (especially 6 per cent. antimonial lead) is preferable, because at a lead surface any trivalent chromium formed at the cathode is more completely oxidised to hexavalent chromium than at an iron surface. Small concentrations of trivalent chromium are present in all used baths, and are not objectionable, but high concentrations increase the resistivity of the solution and decrease the range for bright deposits. By the use of lead anodes as large as practicable, the concentration of trivalent chromium can be kept within the desired limits. The metal deposited is replaced by the periodic addition of chromic acid to the bath.

The deposition of a given thickness of chromium costs more than of other common metals, in spite of the fact that, when purchased in the form of chromic acid, the chromium is cheaper than nickel. The cathodes efficiency is usually less than 15 per cent., and as the deposition involves reduction from a valence of six to zero, the quantity of current required for a given thickness is at least fifteen times that for nickel deposition, in which the valence is two and the cathode efficiency is usually about 90 per cent. In some operations, especially at high temperatures and current densities, the bath voltage is as high as 10 volts, instead of the customary 6 volts used in nickel plating.

Third Census of U.K. Production (1924).—The final report of this Census has now been published in book form, with an appendix containing general statistical tables. Copies (7s. 6d. net) may be obtained from the Stationery Office, Adastral House, Kingsway, London, W.C.2, direct or through any bookseller. Some of the report appeared last year in serial form, and we published extracts last September.

This Week's News in Brief.

Trade Talk.

The telephone number of the Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, has been changed to Blackfriars 6178.

A petition has been presented to the Court for confirmation of the reduction of the capital of the English Steel Corporation, Limited, from £8,234,889 to £2,862,069.

After March 7 the head office of the Mond Nickel Company, Limited, will be transferred to Thames House, Millbank, London, S.W.1. The telephone number will be Victoria 5353.

Messrs. T. Fearnley Allen & Son have changed their address from 20 to 31 Norwich Union Chambers, Congreve Street, Birmingham. The telephone number is unaltered at Central 4038.

For the second time within a month fire broke out at the works of the British Aluminium Company, Limited, Milton, Stoke-on-Trent, recently. The fire, which was confined to the workshops, did considerable damage.

Mr. H. B. Hale, chief costs accountant of Messrs. Steel, Peech & Tozer, Limited, and the United Strip & Bar Mills, Limited, gave an informative address on cost accountancy methods in British steelworks to members of the Sheffield and District Branch of the Institute of Cost and Works Accountants, of which he is hon. secretary.

A large order for sugar-making machinery, involving a sum of £180,000, has been secured by Messrs. Duncan Stewart & Company, Limited, Bridgeton, Glasgow. The order will keep the works fully employed for about six months, day and night. The plant is to equip four factories in India to deal with approximately 500 tons of sugar cane per day.

The tender of the Fairfield Shipbuilding & Engineering Company, Limited, Govan, Glasgow, to construct the woodwork and furniture for the new offices of the Glasgow Electricity Department, at a cost of £2,700, has been accepted by the Glasgow Corporation. This is in all probability the first time in Glasgow that a shipbuilding firm has undertaken a job of this character. Messrs. William Beardmore & Company, Limited, are undertaking construction work in connection with buildings.

The new and recently-completed blast furnace of the Shotts Iron Company, Limited, was put on blast on February 16. After Mr. A. B. Allison, blast-furnace manager, had turned on the blast, the furnace was "paid off" in traditional manner. The first cast was tapped on February 17 by Mr. G. Macbeth, the draughtsman designer of the company, who is a direct descendant of Neilson, the inventor of the hot blast. The event created a hopeful feeling in the district, as the other furnaces of the company have been out of blast since February of last year.

Contracts Open.

Solihull, February 29.—Two electrically-driven centrifugal pumps, including motors, shafting, cast-iron pipes and switchgear, for the Urban District Council. Mr. R. Dunn, surveyor, Council Offices, Solihull.

Thornton, Fife, February 29.—Supply and laying of 940 yds. of 4-in. dia. pipes, for the Fife County Council. Mr. H. F. Hodge, county engineer, County Offices, 34, Viewfield Terrace, Dunfermline. (Deposit of £1 1s.)

Wadebridge, March 1.—Supply and laying of 600 yds. of 4-in. and 785 yds. of 3-in. spun-iron mains, for the Urban District Council. Mr. H. E. Bewes, Council Chambers, Wadebridge. (Fee £1 1s., returnable.)

Company Report.

Mather & Platt, Limited.—Final dividend of 3½ per cent. on the ordinary shares, making 6 per cent. for 1931; £30,057 (against £55,753) is to be carried forward.

Personal.

Mr. G. S. McLay has been elected a director of Messrs. Stewarts & Lloyds, Limited.

Mr. Arthur Dorman has been elected a Vice-President of the Iron and Steel Institute.

Mr. George Batty, technical director of the Steel Castings Development Bureau, has changed his address to P.O. Box 594, Wynnewood, Pennsylvania, U.S.A.

Mr. G. E. Morgan sailed last Tuesday from Liverpool for India, after spending his triennial leave in absence from his position as foundry foreman to the G.I.P.

Mr. G. E. Taylor, chief engineer of the Electric Furnace Company, Limited, 17, Victoria Street, London, S.W., has been appointed a director of the company. He has been associated with this company for over 15 years.

At the annual meeting of the National Federation of Iron and Steel Manufacturers, held in London last week, Mr. E. J. George (managing director of the Consett Iron Company, Limited) was made President-Elect of the Federation.

Obituary.

We regret to announce the death of Mr. Alan F Hilton, metallurgist to the Farrel Birmingham Company, New Haven, U.S.A., at the age of 38. He was rapidly achieving an international reputation.

The death is announced of Herr Carl Irresberger, the well-known German authority on Foundry practice. He wrote the sections on Moulding and Casting for Vol. II of Gerger's famous Handbook for Iron and Steel Foundries.

Mr. Samuel Brassington Bamford has died at his residence at Uttoxeter, at the age of 86. He was the senior director of Messrs. Bamfords, Limited, engineers, of Uttoxeter, and had for many years been prominent in municipal affairs.

Mr. J. W. Aitchison, a well-known Clydeside marine engineer, died suddenly at Rothesay Dock on February 17, whilst inspecting the machinery installed by his firm in the new coaster, "Rowan." Mr. Aitchison was a native of Connel Ferry. He was 61 years of age and a director and one of the founders of the firm of Aitchison, Blair, Limited, Clydebank.

Prof. W. H. Watkinson has died at his home at Bromborough, Cheshire. Prof. Watkinson was successively Lecturer in Engineering at Sheffield, Professor of Engineering in the Glasgow and West of Scotland Technical College, and, for twenty years, Harrison Professor of Engineering at Liverpool University. He was born at Keighley in 1860, and received his technical education at Glasgow University.

The death occurred in Dundee, on February 14, of Mr. David Howie Brown, a figure well known in Scottish ironfounding circles and particularly in Falkirk. Mr. Brown, who was in his 53rd year, served an apprenticeship with Messrs. Kirk & Coutts, Limited, Dundee, and secured an appointment with Carron Company at their Liverpool branch, which he held for 20 years. Mr. Brown then returned to the company's head offices at Falkirk to become commercial manager, a post he held until two years ago, when he retired on account of ill-health.

We regret to announce the death of Mr. Archibald Ballantine, Caer-edin, Bo'ness, in his 70th year. He was the younger son of the late Mr. Archibald Ballantine, ornamental and architectural iron-founder, who established Grange Foundry in 1856, and who, 20 years later, built New Grange Foundry. In 1897 old Archibald Ballantine died, and thereafter the firm adopted the name of A. Ballantine & Sons. The management devolved upon the two sons, David and Archibald. In 1909 the business was formed into a private limited company, and Mr. Archibald Ballantine was appointed managing director. In 1918, when the National Light Castings Association was formed, Mr. Ballantine was among the first to enrol as a member, and he was most regular in attendance at the meetings.

Book Review.

Symposium on Malleable-Iron Castings.

The symposium in which the Papers and data published in this book were given, was held in a session of the 1931 A.S.T.M. annual meeting and was sponsored jointly by the American Foundrymen's Association and the American Society for Testing Materials. Their purpose was to provide the engineering profession with authoritative data in concise form on the properties of malleable iron and castings poured from this metal, produced by the best present methods.

This book of 122 pages contains the thought and practical ideas of many leaders in the malleable-iron industry, many of whom with their companies have contributed data and information for inclusion. The committee which prepared the book has reviewed critical data on malleable iron from a large number of diversified sources and compiled a complete and authoritative summary of the known chemical, physical, mechanical and electrical properties of malleable iron.

After an introduction which defines the material covered and points out the major points in the symposium there is an extensive section which treats of the manufacture of malleable-iron castings. Next, the available data on properties of malleable iron is presented. Much of this has not heretofore been gathered in a concise form. There are sections given over to supplementary data and discussions of tensile properties. A statistical analysis of the tensile test data was prepared by Dr. W. A. Shewhart, of the Bell Telephone Laboratories.

Other sections are devoted to higher strength malleable iron, cupola malleable iron and the necessity of co-operation between engineer-designer and the foundry. A résumé of current specifications for malleable-iron castings is also given. An extensive Paper by Professor O. W. Boston, of the College of Engineering, University of Michigan, dealing with "An Investigation of Metals to Determine the Machineability of Malleable-Iron Castings" is included in the symposium. "Corrosion of Malleable Iron" is the title of the other Paper included, written by Messrs. F. L. Wolf, Chief Engineer and Technical Superintendent, and L. A. Meisse, Research Metallurgist, The Ohio Brass Company. The oral and written discussions given during the session are included in the book.

Copies can be obtained from the American Foundrymen's Association, 222, W. Adams Street, Chicago, or the American Society for Testing Materials, 1315, Spruce Street, Philadelphia. The price is 75 cents with heavy paper binding.

Company Meeting.

Agricultural & General Engineers, Limited.—Sir Gilbert Garnsey was last week appointed receiver and manager. The result of the working for the year ended March 31, 1931, was a loss of £235,226, and the debit balance on the profit and loss account is now shown at £591,344. The trading results for the period since March 31, 1931, states the report, have been very unsatisfactory, and the company has come to the end of its financial resources. Mr. G. E. Rowland, the former chairman, resigned his directorship of the company and of certain associated companies on February 5 last. Messrs. G. D. Perks, the vice-chairman, H. Carlisle, L. W. Smith and A. Leggett similarly resigned their directorships on February 11 last. The joint investigators, Lord Plender and Sir Gilbert Garnsey, have not yet had time to make their report.

Nickel Information Bureau.—The latest addition to this group, which is already established in London, Paris, Brussels, Milan and New York, is, we are advised, to be established in Japan, under the direction of Mr. J. A. Rabbitt, of the International Nickel Company.

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HIGH CLASS ENGINEERING CASTINGS, MOTOR CYLINDERS, LIGHT CASTINGS, RAINWATER GOODS, BATHS, RANGES, GRATES, STOVES, HOLLOW WARE and all FOUNDRY PURPOSES.

We also make Forge Iron for Wrought Iron Makers and Basic Iron for Steel Works use.

RANGE OF ANALYSIS

SILICON : ·50% to 5%
SULPHUR : trace to ·10%
MANGANESE : ·30% to 4%
PHOSPHORUS : ·50% and upwards

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AS USED BY THE LEADING IRON FOUNDERS.

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Raw Material Markets.

Reports from the various iron and steel markets indicate that business has been very quiet in all directions. Sellers of pig-iron find that new business is scarce, although deliveries against current contracts are maintained at a steady level. There is also only an irregular demand for finished steel. The export trade is slack, owing to the sore straits of many overseas consumers, and the difficulty of carrying through a transaction.

Pig-Iron.

MIDDLESBROUGH.—Business has been slightly better in the iron and steel market and more confidence is being expressed. Shipments of iron and steel from the Tees are maintained at their improved level, and many inquiries are received from overseas. Local consumption of pig-iron is steady, and regular deliveries against contracts are being made. Immediate sales have also shown some improvement. The output of the six furnaces now producing Cleveland foundry iron is all going into consumption, and the makers soon hope to liquidate the stocks of unsold iron still in their possession. Prices remain at the minimum level, as follows:—No. 3 Cleveland G.M.B., 58s. 6d.; No. 1 foundry, 61s.; No. 4 foundry, 57s. 6d.; No. 4 forge iron, 57s. per ton.

The East Coast hematite market remains in a weak position, and quotations vary considerably. Some makers adhere to 65s. per ton for named brands, but 64s. is the general price for ordinary mixed numbers. Even this figure has been shaded in one or two instances. There is no improvement in consumption, and heavy stocks at the makers' works remain a source of weakness to the market. In the West Coast hematite market, Bessemer mixed numbers remain nominally at 66s. per ton, but, sales being so limited, it is with difficulty that prices are maintained.

LANCASHIRE.—Deliveries of foundry iron, particularly to textile machinists, remain on a slightly improved scale, but it is hinted in some quarters that more iron is being put into stock. The majority of current contracts will soon be running out, and at present there is no sign of renewing them. It is to be hoped that there will be no general return to hand-to-mouth buying. Prices remain unaltered, with Midland foundry makes offered for delivery to users in the Manchester price zone at 67s. per ton, North-East Coast at 67s., Northamptonshire at 65s. 6d., Derbyshire forge iron at 62s., Scottish pig-iron at about 87s. and West Coast hematite at 81s.

MIDLANDS.—The pig-iron market has been quieter during the past week, and few new specifications are being given out. The light-castings foundries in this district are not so busy as they were a fortnight ago. For delivery to Birmingham and Black Country stations, makers continue to quote 62s. 6d. for Northants No. 3 and 66s. for Derbyshire, North Staffordshire and Lincolnshire No. 3.

SCOTLAND.—Another furnace has been blown in on foundry iron, making three on foundry and three on hematite in Scotland. The extra output, however, is only needed for the replacement of the producers' stocks, and actual consumption remains as low as ever. Some business has been inevitably diverted from the Continent to the home works, but the requirements of consumers in general remain limited. No. 3 Scottish foundry remains at 69s. 6d. per ton, with 2s. 6d. extra for No. 1. No. 3 Cleveland iron is quoted at 59s. per ton at Grangemouth, with other English makes at 2s. per ton less.

Coke.

Coke prices are unchanged, and there is little movement in the markets. The demand is still restricted, but at the same time production also is curtailed, which keeps the markets steady. Best Durham foundry coke is offered delivered in the Birmingham area at 37s. 6d., with other grades at 35s. Welsh foundry coke is obtainable at 30s. up to 45s., according to analysis.

Steel.

The demand for finished steel remains poor, and there is keen competition for the business available. Activity in the steel bar market is of a hand-to-mouth character. Continental bars continue to arrive in large numbers. The supply of semi-finished material considerably exceeds the demand, many consumers holding heavy stocks. There have only been a few miscellaneous transactions in Continental semis, and the forward position remains too uncertain to allow of any business.

Scrap.

In the Cleveland scrap-iron market, supplies continue to exceed the demand, and many of the foundries hold heavy stocks. Heavy metal is quoted at 42s. 6d., while machinery quality is at 45s. and light castings at 38s. The same position prevails in the Midlands market, and little business is being done. Heavy machinery broken into cupola sizes, is offered at 52s. 6d. per ton delivered, good heavy at 45s. to 47s. 6d. per ton delivered and clean light at 40s. to 42s. 6d. per ton delivered. There is little demand for scrap iron in the Scottish and South Wales markets, and prices are correspondingly weak.

Metals.

Copper.—The copper market has remained steady since last Tuesday's increase in the Exporters' c.i.f. quotation, which now continues at 6.625 cents per lb. There was at first a slight increase in buying, but the demand has fallen off somewhat in the last day or two, and the market is inclined to await developments. There has been an improved call for Empire brands, owing to the expectations of a tariff on foreign metal, which, however, it now transpires is not to be imposed. Consumption in the United States and on the Continent remains low, and hand-to-mouth buying still prevails.

Closing quotations:—

Cash.—Thursday, £38 17s. 6d. to £39; Friday, £38 10s. to £38 15s.; Monday, £38 7s. 6d. to £38 10s.; Tuesday, £36 17s. 6d. to £37 2s. 6d.; Wednesday, £35 13s. 9d. to £35 16s. 3d.

Three Months.—Thursday, £38 5s. to £38 7s. 6d.; Friday, £37 18s. 9d. to £38; Monday, £37 7s. 6d. to £37 10s.; Tuesday, £36 7s. 6d. to £36 10s.; Wednesday, £35 16s. 3d. to £35 17s. 6d.

Tin.—Interest has mainly centred on the improvement in demand in the U.S.A., where quite a brisk spell of buying has been experienced. Consumers in England have not shown much interest, being assured that their supplies of tin are to be exempted from the 10 per cent. *ad valorem* tariff. The East quotation was raised by £9 last week, possibly owing to Japanese buying, but the London and New York markets did not follow suit. The outlook remains very uncertain.

Official closing prices:—

Cash.—Thursday, £140 15s. to £140 17s. 6d.; Friday, £140 2s. 6d. to £140 7s. 6d.; Monday, £140 12s. 6d. to £140 15s.; Tuesday, £139 15s. to £139 17s. 6d.; Wednesday, £139 5s. to £139 7s. 6d.

Three Months.—Thursday, £143 7s. 6d. to £143 10s.; Friday, £142 15s. to £142 17s. 6d.; Monday, £143 2s. 6d. to £143 5s.; Tuesday, £142 2s. 6d.; to £142 7s. 6d.; Wednesday, £141 10s. to £141 12s. 6d.

Spelter.—Home consumption remains limited, and sales are small and of miscellaneous character. The galvanising trade is experiencing difficult times, and it is being demanded that spelter should be exempted from the general tariff. A large part of the spelter imported comes from the British Empire, but the latter brand is normally all electrolytic, and as such would command a premium.

Daily fluctuations:—

Ordinary.—Thursday, £14 7s. 6d.; Friday, £14 5s.; Monday, £14 2s. 6d.; Tuesday, £13 15s.; Wednesday, £13 5s.

Lead.—The market for soft foreig lead remains steady. It is understood that a 20s. premium was at one time being asked for Empire metal, though this may have been subsequently lowered. At all events, such a development is not very desirable, and it is causing unfavourable comment amongst consumers in this country.

The week's prices have been:—

Soft Foreign (Prompt).—Thursday, £15; Friday, £14 18s. 9d.; Monday, £14 15s.; Tuesday, £14 7s. 6d.; Wednesday, £14 2s. 6d.

The Fourth International Foundry Congress.

TO BE HELD AT PARIS NEXT SEPTEMBER.

We have received from Mr. C. Dufour, the President of the Syndicat Général des Fondeurs de France (French Foundry Employers' Federation) much information relative to the Exhibition which is to be held in connection with this Congress. The exhibition is under the distinguished patronage of the Ministers of Commerce and Industry, Foreign Affairs, Public Works; War; Admiralty; the Under-Secretary for Technical Education and the Secretary of State for Air.

The Exhibition will include the following sections:—

(1) Raw materials necessary for the manufacture of castings in iron, steel, malleable, copper, brass, bronze, aluminium and all other metals.

(2) The articles manufactured by founders, either as rough castings, or machined castings, or as complete machines, of which castings are the principal elements.

(3) Foundry plant (melting, sand plant, sand blast, fettling, annealing, core-shop plant, handling, etc.), either in motion (under special control-reservations of the Prefecture of the Police) or stationary. The available ground space will allow exhibitors to show complete foundries under working conditions, with sand plant, stoves, overhead travelling cranes, mechanical transporting arrangements, melting plant and the like.

(4) All classes of foundry tools and supplies.

Electric power for operating plant will be supplied under conditions which will be published later. The General Director of Technical Education and the Foundry High School will take Stands at the Exhibition.

Competitions are to be organised; details will be forthcoming later. These will relate to apprenticeship, teaching and education, whilst visits to factories will also take place during the Exhibition.

It is understood that all installation proposals must be submitted to the Organising Committee, which reserves the sole right to refuse any application for space without being compelled to state the grounds for such refusal. They have also the right to vary any propositions. All such propositions must be submitted to this committee for approval.

Mr. Dufour has enclosed with his letter a full description of the groups and classes into which the Exhibition is divided, the rules and regulations to which exhibitors are bound, and an Application for Space form, all of which are printed in excellent English. We are asking Mr. Dufour for a supply of these, and we will send along copies to anyone interested. It appears to us that conditions are specially favourable at the moment for showing goods of British manufacture at this Exhibition. It should be borne in mind that Paris and not London is the capital of Europe, and one can count on meeting the representatives of every European nation at this Exhibition.

Tracing Cloth.—Messrs. B. J. Hall & Company, Limited, Stourton House, Dacre Street, London, S.W.1, have sent us a leaflet and two samples of tracing cloth. Its virtue is that pencil lines are so black that they are suitable for Press reproductions without a final inking in. Before making further comment, we are passing this to our own drawing office for their report.

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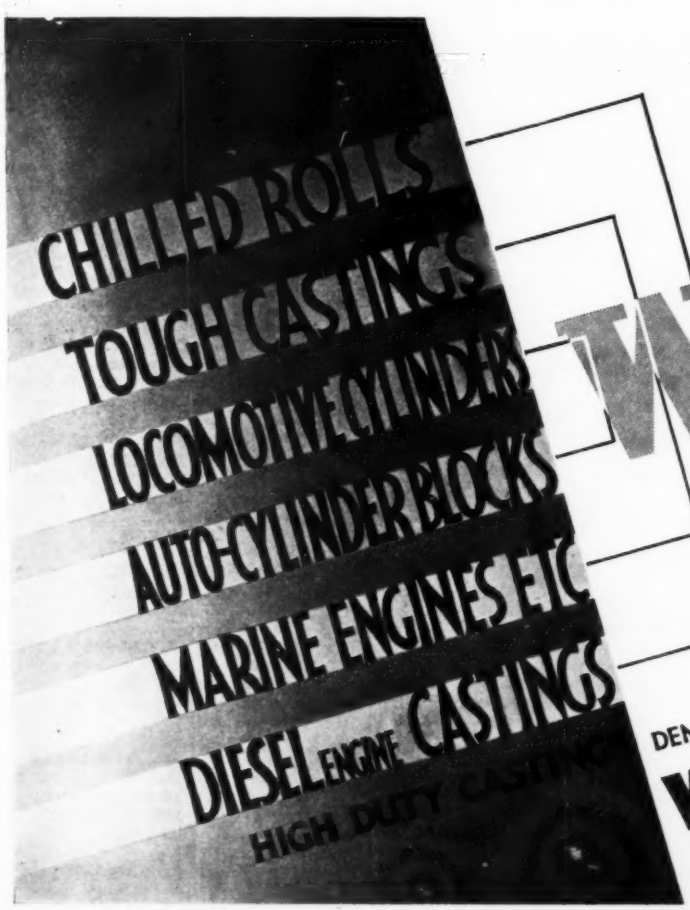

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WEEKLY PRICE CURRENT.

COPPER.

	£ s. d.
Standard cash	35 13 9
Three months	35 16 3
Electrolytic	40 10 0
Tough	39 0 0
Best selected	39 10 0
Sheets	72 0 0
India	49 0 0
Wire bars	42 15 0
Do., March	42 2 6
Do., April	41 10 0
Ingot bars	42 15 0
H.C. wire rods	45 0 0
Off. av. cash, Jan.	39 10 1½
Do., 3 mths., Jan.	39 12 9¾
Do., Sttlmnt., Jan.	39 9 7½
Do., Electro, Jan.	47 1 6
Do., B.S., Jan.	41 16 10½
Do., wire bars, Jan.	47 19 0
Solid drawn tubes	11d.
Brazed tubes	11d.
Wire	7½d.

BRASS.

Solid drawn tubes	9½d.
Brazed tubes	11½d.
Rods, drawn	8½d.
Rods, extd. or rlld.	5½d.
Sheets to 10 w.g.	8½d.
Wire	8½d.
Rolled metal	7½d.
Yellow metal rods	5½d.
Do. 4 × 4 Squares	6½d.
Do. 4 × 3 Sheets	6½d.

TIN.

	£ s. d.
Standard cash	139 5 0
Three months	141 10 0
English	140 10 0
Bars	143 0 0
Straits	142 12 6
Australian	141 5 0
Eastern	146 7 6
Banca (nom.)	151 15 0
Off. av. cash, Jan.	140 5 6¾
Do., 3 mths., Jan.	143 6 3
Do., Sttlmt., Jan.	140 5 4½

SPELTER.

	£ s. d.
Ordinary	13 5 0
Remelted	12 15 0
Hard	11 0 0
Electro 99.9	16 2 6
English	14 12 6
India	13 5 0
Zinc dust	23 0 0
Zinc ashes	3 10 0
Off. aver., Jan.	14 12 6
Aver. spot, Jan.	14 8 3¾

LEAD.

	£ s. d.
Soft foreign ppt.	14 2 6
English	15 15 0
Off. average, Jan.	15 2 1½
Average spot, Jan.	15 1 8¼

ZINC SHEETS, &c.

	£ s. d.
Zinc sheets, English	24 10 0
Do., V.M. ex-whf.	23 0 0
Rods	29 0 0
Boiler plates	—
Battery plates	—

ANTIMONY.

	£ s. d.
Special brand, Eng.	40 0 0
Chinese (nom.)	30 10 0
Crude	22 0 0

QUICKSILVER.

	£ s. d.
Quicksilver (nom.)	17 12 6

FERRO-ALLOYS AND STEEL-MAKING METALS.

Ferro-silicon—	
25%	7 0 0
45/50%	11 17 6
75%	17 0 0
Ferro-vanadium—	
35/50%	12/8 lb. Va.
Ferro-molybdenum—	
70/75% c. free, 4/2, plus 55%, per lb. of Mo.	
Ferro-titanium—	
23/25% carbon-free	11¾d. lb.
Ferro-phosphorus, 20/25%	£20 17 6
Ferro-tungsten—	
80/85%	1/8½ lb. plus 20%
Tungsten metal powder—	
98/99%	1/11½ lb. plus 20%
Ferro-chrome—	
2/4% car.	£34 15 0
4/6% car.	£24 17 6
6/8% car.	£23 10 0
8/10% car.	£22 15 0
Ferro-chrome—	
Max. 2% car.	£37 2 6
Max. 1% car.	£43 0 0
Max. 0.70% car.	£51 10 0
70% carbon-free	1/- lb.
Nickel—80/99.5%	£240 to £245
Ferro-cobalt	10/- lb.
Aluminium 98/99%	£95 0 0
Metallic chromium—	
96/98%	3/- lb.
Ferro-manganese (net)—	
76/80% loose	£10 15 0 to £11 5 0
76/80% packed	£11 15 0 to £12 5 0
76/80% export	(nom.) £ 9 0 0
Metallic manganese—	
94/96% carbon-free	1/6 lb.

Per ton unless otherwise stated.

HIGH-SPEED TOOL STEEL.

Finished bars, 14% tungsten	2s. 0d.
Finished bars, 18% tungsten	2s. 9d.

Per lb. net, d/d buyers' works.

Extras—	
Rounds and squares, 3 in. and over	4d. lb.
Rounds and squares, under ½ in. to ¼ in.	3d. lb.
Do., under ¼ in. to 3/16 in.	1/- lb.
Flats, ½ in. × ¼ in. to under 1 in. × ¼ in.	3d. lb.
Do., under ½ in. × ¼ in.	1/- lb.
Bevels of approved sizes and sections	6d. lb.

Bars cut to length, 10% extra.

SCRAP.

	£ s. d.	£ s. d.
South Wales—		
Heavy steel	2 5 0	to 2 6 0
Bundled steel and shrngs.	1 17 0	to 1 18 0
Mixed iron and steel	2 0 0	to 2 2 0
Heavy cast iron	2 6 0	to 2 7 0
Good machinery for foundries	2 10 0	to 2 11 0
Cleveland—		
Heavy steel	1 17 6	to 2 0 0
Steel turnings	1 12 6	
Cast-iron borings	1 6 0	
Heavy forge	2 17 6	
W.I. plate scrap	2 10 0	
Cast-iron scrap	2 2 6	to 2 5 0
Midlands—		
Light cast-iron scrap	2 0 0	
Heavy wrought iron	2 12 6	
Steel turnings, f.o.r.	1 2 6	
Scotland—		
Heavy steel	2 2 0	
Ordinary cast iron	2 7 6	
Engineers' turnings	1 11 6	
Cast-iron borings	1 11 6	
Wrought-iron piling	2 6 0	
Heavy machinery	2 15 0	

London—Merchants' buying prices delivered yard.

	£ s. d.
Copper (clean)	30 0 0
Brass	21 0 0
Lead (less usual draft)	12 0 0
Tea lead	9 0 0
Zinc	6 10 0
New aluminium cuttings	62 0 0
Braziery copper	27 0 0
Gunmetal	26 0 0
Hollow pewter	90 0 0
Shaped black pewter	70 0 0

PIG-IRON.

(f.o.t. unless otherwise stated.)

N.E. Coast—	
Foundry No. 1	61/-
Foundry No. 3	58/6
Foundry No. 4	57/6
Forge No. 4	57/-
Hematite No. 1	64/6
Hematite M/Nos.	64/-
N.W. Coast—	
Hem. M/Nos. d/d Glas.	73/-
„ d/d Birm.	84/6
Malleable iron d/d Birm.	117/6
Midlands—	
Staffs common*	—
„ No. 4 forge*	61/-
„ No. 3 fdry.*	66/-
Shrops basic	—
„ Cold blast, ord.	—
„ „ roll iron	—
Northants forge*	57/6
„ fdry. No. 3*	62/6
„ fdry. No. 1*	65/6
Derbyshire forge*	61/-
„ fdry. No. 3*	66/-
„ fdry. No. 1*	69/-
„ basic*	—

*d/d Black Country dist.

Scotland—	
Foundry No. 1	72/-
„ No. 3	69/6
Hem. M/Nos. d/d	68/6
Sheffield (d/d district)—	
Derby forge	58/6
„ fdry. No. 3	63/6
Lincs forge	—
„ fdry. No. 3	63/6
E.C. hematite	74/6
W.C. hematite	83/6
Lancashire (d/d eq. Man.)—	
Derby forge	62/-
„ fdry. No. 3	67/-
Staffs fdry. No. 3	67/-
Northants fdry. No. 3	65/6
Cleveland fdry. No. 3	67/-
Dalzell, No. 3 (special)	102/6 to 105/-
Glengarnock, No. 3	87/-
Clyde, No. 3	87/-
Monkland, No. 3	87/-
Summerlee, No. 3	87/-
Eglinton, No. 3	87/-
Gartsherrie, No. 3	87/-
Shotts, No. 3	87/-

FINISHED IRON AND STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

Iron—	£ s. d.	£ s. d.
Bars (cr.)	9 15 0	to 10 0 0
Nut and bolt iron	8 7 6	to 8 10 0
Hoops	10 10 0	to 12 0 0
Marked bars (Staffs) f.o.t.	12 0 0	
Gas strip	10 10 0	to 12 0 0
Bolts and nuts, ¾ in. × 4 in.	12 5 0	
Steel—		
Plates, ship, etc.	8 15 0	to 8 17 6
Boiler plts.	8 12 6	to 9 12 6
Chequer plts.		10 7 6
Angles		8 7 6
Tees		9 7 6
Joists		8 15 0
Rounds and squares, 3 in. to 5½ in.		9 7 6
Rounds under 3 in. to ¾ in. (Untested)	6 15 0	& up.
Flats—8 in. wide and over		8 12 6
„ under 8 in. and over 5 in.		8 17 6
Rails, heavy	8 5 0	to 8 10 0
Fishplates		12 0 0
Hoops (Staffs)		9 10 0
Black sheets, 24g.	8 0 0	to 9 0 0
Galv. cor. shts.	9 10 0	to 10 5 0
Galv. flat shts.	10 0 0	to 11 5 0
Galv. fencing wire, 8g. plain	12 10 0	
Billets, soft	5 7 6	to 5 12 6
Billets, hard		6 12 6
Sheet bars	4 15 0	to 5 7 6
Tin bars		4 15 0

PHOSPHOR BRONZE.

	Per lb. basis.
Strip	11½d.
Sheet to 10 w.g.	12½d.
Wire	13d.
Rods	11¾d.
Tubes	17d.
Castings	13d.

Delivery 3 cwt. free.
10% phos. cop. £30 above B.S.
15% phos. cop. £35 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. CLIFFORD & SON, LIMITED.

NICKEL SILVER, &c.

	Per lb.
Ingots for raising	7d. to 1/1
Rolled—	
To 9 in. wide	1/1 to 1/7
To 12 in. wide	1/1½ to 1/7½
To 15 in. wide	1/1½ to 1/7½
To 18 in. wide	1/2 to 1/8
To 21 in. wide	1/2½ to 1/8½
To 25 in. wide	1/3 to 1/9
Ingots for spoons and forks	7d. to 1/3½
Ingots rolled to spoon size	10d. to 1/6½
Wire round—	
to 10g.	1/4½ to 1/11½

with extras according to gauge.
Special 5ths quality turning rods in straight lengths, 1/3½ upwards.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

	Dols.
No. 2 foundry, Phila.	15.64
No. 2 foundry, Valley	15.00
No. 2 foundry, Birm.	11.00
Basic	16.49
Bessemer	17.39
Malleable	17.49
Grey forge	16.89
Ferro-mang. 80%	75.00
O.-h. rails, h'y, at mill	43.00
Billets	27.00
Sheet bars	26.00
Wire rods	37.00
	Cents.
Iron bars, Phila.	2.11
Steel bars	1.50
Tank plates	1.50
Beams, etc.	1.50
Skelp, grooved steel	1.50
Skelp, sheared steel	1.50
Steel hoops	1.65
Sheets, black, No. 24	2.15
Sheets, galv., No. 24	2.75
Wire nails	1.95
Plain wire	2.20
Barbed wire, galv.	2.60
Tinplates, 100-lb. box	$4.75

COKE (at ovens).

Welsh foundry	22/6 to 27/6
„ furnace	17/6 to 18/-
Durham and Northumberland—	
„ foundry	14/6 to 15/-
„ furnace	14/- to 14/6
Midlands, foundry	—
„ furnace	—

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. cokes	20×14 per box	14/- to 14/6
„	28×20 „	28/- to 29/-
„	20×10 „	—
„	18¾×14 „	—
C.W.	20×14 „	12/9 to 13/-
„	28×20 „	25/3
„	20×10 „	19/4½
„	18¾×14 „	13/9

SWEDISH CHARCOAL IRON & STEEL.

Pig-iron	£6 0 0 to £7 0 0
Bars, hammered, basis	£16 10 0 to £17 0 0
Bars and nail-rods, rolled, basis	£15 17 6 to £16 5 0
Blooms	£10 0 0 to £12 0 0
Keg steel	£32 0 0 to £33 0 0
Faggot steel	£18 0 0 to £23 0 0
Bars and rods dead soft, st'l	£10 0 0 to £12 0 0

All per English ton, f.o.b. Gothenburg.
[Subject to an exchange basis of Kr. 18.16 to £1.]

TUBES AND FITTINGS.

Current Discounts.

	Tubes.	*Fittings.*
Gas	65%	57½%
Water ..	61½%	52½%
Steam ..	57½%	47½%

DAILY FLUCTUATIONS.

Standard Copper (cash).

			£	s.	d.		
Feb.	18	..	38	17	6	inc.	2 6
..	19	..	38	10	0	dec.	7/6
..	22	..	38	7	6	..	2/6
..	23	..	36	17	6	..	30/-
..	24	..	35	13	9	..	23/9

Electrolytic Copper.

			£	s.	d.		
Feb.	18	..	41	10	0	dec.	10/-
..	19	..	41	0	0	..	10/-
..	22	..	41	0	0	No change	
..	23	..	41	0	0	.. ..	
..	24	..	40	10	0	dec.	10/-

Standard Tin (cash).

			£	s.	d.		
Feb.	18	..	140	15	0	inc.	5/-
..	19	..	140	2	6	dec.	12/6
..	22	..	140	12	6	inc.	10/-
..	23	..	139	15	0	dec.	17/6
..	24	..	139	5	0	..	10/-

Tin (English ingots).

			£	s.	d.		
Feb.	18	..	142	0	0	inc.	5/-
..	19	..	141	10	0	dec.	10/-
..	22	..	142	0	0	inc.	10/-
..	23	..	141	0	0	dec.	20/-
..	24	..	140	10	0	..	10/-

Zinc Sheets (English).

			£	s.	d.		
Feb.	18	..	24	10	0	No change	
..	19	..	24	10	0	..	..
..	22	..	24	10	0	..	..
..	23	..	24	10	0	..	..
..	24	..	24	10	0	..	..

Spelter (ordinary).

			£	s.	d.		
Feb.	18	..	14	7	6	dec.	1/3
..	19	..	14	5	0	..	2/6
..	22	..	14	2	6	..	2/6
..	23	..	13	15	0	..	7/6
..	24	..	13	5	0	..	10/-

Lead (English).

			£	s.	d.		
Feb.	18	..	17	0	0	No change	
..	19	..	17	0	0	..	..
..	22	..	16	15	0	dec.	5/-
..	23	..	16	5	0	..	10/-
..	24	..	15	15	0	..	10/-

AVERAGE MONTHLY PRICES OF RUBIO ORE (MIDDLESBROUGH).

Year.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly average.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1894	0 12 6	0 12 6	0 12 7½	0 12 1½	0 12 4	0 12 1	0 12 0	0 12 0½	0 11 10½	0 12 2	0 12 0	0 12 0	0 12 1½
1895	0 12 0	0 12 0	0 11 10	0 12 0	0 12 0	0 12 3	0 12 3	0 12 4	0 12 4	0 12 6	0 12 7	0 12 6	0 12 2½
1896	0 12 6	0 12 6	0 12 9	0 12 9	0 12 9	0 12 7	0 12 9	0 12 9	0 12 9	0 13 6	0 15 0	0 14 9	0 13 1
1897	0 15 3	0 15 6	0 15 3	0 15 0	0 14 0	0 14 3	0 14 3	0 14 0	0 14 0	0 15 0	0 14 3	0 15 3	0 14 8
1898	0 15 0	0 14 4	0 14 9	0 14 6	0 15 0	0 15 0	0 14 0	0 14 0	0 14 0	0 14 9	0 15 0	0 14 9	0 14 7
1899	0 15 0	0 15 3	0 15 6	0 15 6	0 15 9	0 16 0	0 17 6	0 18 0	0 17 9	0 18 0	0 19 0	1 0 0	0 16 11½
1900	1 1 0	1 0 6	1 1 0	1 0 9	1 1 0	1 1 0	1 1 3	1 1 6	1 1 3	1 1 3	1 0 0	0 18 0	1 0 8½
1901	0 17 6	0 16 0	0 15 0	0 14 6	0 15 6	0 15 9	0 14 9	0 15 3	0 15 9	0 15 9	0 15 9	0 15 9	0 15 7½
1902	0 15 6	0 15 0	0 16 0	0 16 0	0 15 6	0 15 3	0 15 6	0 16 0	0 16 0	0 15 9	0 15 9	0 15 6	0 15 8½
1903	0 15 6	0 16 0	0 16 6	0 16 3	0 16 3	0 16 10	0 15 9	0 15 6	0 15 6	0 14 9	0 14 9	0 15 1	0 15 8
1904	0 14 9	0 15 3	0 15 1	0 15 4	0 15 3	0 15 0	0 14 5	0 14 6	0 14 6	0 14 6	0 14 6	0 14 7	0 14 9½
1905	0 15 3	0 15 6	0 15 0	0 15 3	0 15 6	0 15 6	0 15 6	0 15 6	0 16 6	0 18 6	0 18 9	0 18 9	0 16 3½
1906	1 0 0	1 1 6	1 0 0	1 0 0	0 19 6	1 0 0	0 19 6	0 19 4	1 0 6	1 1 6	1 1 9	1 3 6	1 0 7
1907	1 3 6	1 2 6	1 2 6	1 2 0	1 1 6	1 2 3	1 2 3	1 2 0	1 1 0	0 19 0	0 18 9	0 17 6	1 1 2½
1908	0 16 6	0 15 0	0 15 6	0 15 6	0 15 3	0 15 0	0 15 0	0 14 9	0 15 0	0 16 0	0 16 0	0 16 0	0 15 5½
1909	0 15 9	0 16 3	0 16 0	0 16 0	0 16 3	0 16 6	0 16 0	0 16 0	0 17 0	0 17 0	0 17 6	0 17 6	0 16 6
1910	1 0 4	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 3	1 0 3	1 0 6½	1 1 3	1 1 5	1 0 9½
1911	1 2 2½	1 2 6	1 2 6	1 1 11½	1 0 11½	0 19 6	0 19 0	0 19 0	0 19 1½	0 19 6	1 0 0½	1 1 6½	1 0 7½
1912	1 2 3	1 2 6	1 2 6	1 1 1½	1 1 6	1 1 6	1 1 6	1 2 3	1 2 6	1 3 0	1 3 0	1 2 11	1 2 2½
1913	1 2 9	1 2 2	1 1 7½	1 1 6	1 0 8½	1 0 0	1 0 0	1 0 0	0 19 10½	0 19 1½	0 19 0	0 19 0	1 0 5½
1914	0 18 7½	0 18 0	0 18 0	0 17 9	0 17 6	0 17 6	0 17 1½	0 19 7½	0 18 11½	0 17 10½	0 18 7½	1 1 0½	0 18 8½
1915	1 7 7½	1 8 6	1 9 3	1 10 2½	1 8 6	1 6 4	1 5 10½	1 6 0	1 6 10½	1 10 8½	1 13 0	1 17 10	1 9 1½
1916	1 18 6	2 0 1½	2 2 6½	2 0 6½	1 15 0	1 16 3	1 18 0	1 18 0	1 18 0	—	—	—	—
1917	} Price Fixed												
1918													
1919	—	—	—	—	2 5 7½	2 14 4½	2 16 4½	2 14 0	2 13 4½	2 13 0	2 12 7½	2 11 9	—
1920	2 17 0	3 7 9	2 15 6	3 6 7	3 0 0	2 15 0	2 14 0	2 9 9	2 7 6	2 11 0	2 12 3	2 10 0	2 15 0
1921	2 1 0	2 0 1½	1 18 3	1 17 6	1 17 6	1 17 6	1 17 6	1 5 0	1 8 9½	1 7 9	1 7 0	1 7 0	1 13 8½
1922	1 6 7½	1 5 10½	1 6 11	1 7 0	1 7 0	1 7 6	1 5 3	1 4 9½	1 4 2½	1 3 3½	1 2 6	1 2 3	1 5 2½
1923	1 2 9½	1 4 6½	1 5 2	1 4 8½	1 4 6	1 4 0	1 3 6	1 3 0	1 3 0	1 3 0	1 3 2½	1 4 9	1 3 10½
1924	1 4 2½	1 4 0	1 4 0	1 3 7½	1 3 8½	1 3 6	1 2 11	1 2 6	1 2 1½	1 1 7½	1 2 3	1 2 6	1 3 1
1925	1 2 6	1 2 1½	1 2 0	1 2 0	1 2 0	1 1 6	1 0 6	1 0 0	1 0 0	1 0 0	1 0 3	1 0 10½	1 1 1½
1926	1 1 1½	1 1 6	1 1 6	1 1 3½	1 1 3	1 1 5½	1 1 6	1 1 6*	1 1 0*	1 1 6*	1 1 6*	*	1 1 4½
1927	1 2 1½	1 2 3	1 2 1½	1 2 0	1 2 0	1 2 0	1 1 7½	1 1 0	1 1 0	1 1 0	1 1 0	1 1 0	1 1 7½
1928	1 1 0	1 1 1½	1 1 11	1 2 4½	1 2 6	1 2 6	1 2 6	1 2 6	1 2 6	1 2 6	1 2 6	1 2 6	1 2 2½
1929	1 2 6	1 2 6½	1 2 11½	1 3 0	1 3 0	1 3 2½	1 4 0	1 4 8½	1 4 7½	1 4 6	1 4 6	1 4 3	1 3 7½
1930	1 3 3½	1 2 6	1 1 9	1 1 6	1 0 10½	1 0 0	1 0 0	0 19 6	0 19 0	0 17 4½	0 16 4½	0 16 4½	0 19 10½
1931	0 16 1½	0 16 0	0 16 0	0 15 11½	0 15 4½	0 15 0½	0 14 10½	0 14 3½	0 14 6	0 16 8½	0 17 0½	0 16 6	0 15 9
1932	0 16 6	—	—	—	—	—	—	—	—	—	—	—	—

* Prices nominal.

WILLIAM JACKS & COMPANY,

WINCHESTER HOUSE, OLD BROAD ST., LONDON, E.C.2.

CLARENCE CHAMBERS, 39, CORPORATION STREET, BIRMINGHAM.

13, RUMFORD STREET, LIVERPOOL.

PIG IRON

REGISTERED TRADE MARK

All grades FOUNDRY, HEMATITE, BASIC, SPECIALS, &c.

NON-FERROUS METALS

COPPER, TIN, LEAD, SPELTER, ANTIMONY, CHROME ORE.

WILLIAM JACKS & COMPANY,

19, ST. VINCENT PLACE, GLASGOW.

ZETLAND ROAD, MIDDLESBROUGH.

XUM

SMALL ADVERTISEMENTS.

Notice.

Small Advertisements in this section of the Journal are accepted at the prepaid rate of 6d. per line, first line in capitals counting two, average 6 words per line. Minimum charge for one insertion 3/-

(A remittance should accompany instructions.)

SITUATIONS VACANT AND WANTED.

FOREMAN Moulder and Manager for 12 years desires position; age 40; thorough practical loam, dry, green sand, also machine moulding; of proved ability; good organiser; all classes of engineering castings; sound references.—Box 118, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOREMAN PATTERNMAKER nine years, Foundry and Patternshop Manager two years, desires change; modern methods, P.W. or D.W.: extensive experience internal-combustion, steam, pumps, general; do own estimating; excellent references; age 35.—Box 122, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOUNDRY Foreman desires position; 30 years' experience iron and steel, jobbing and mass production; American and Canadian experience.—Box 116, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOREMAN PATTERNMAKER required to take charge of Wood and Metal Patternshops. Must be thoroughly conversant with modern production methods of moulding and pattern equipment.—Applications in writing, stating full particulars of qualifications, to WORKS MANAGER, QUALCAST, LIMITED, Derby.

FOREMAN wanted for small foundry producing high-grade castings. Must have experience machine moulding and cupola practice. Give full particulars of experience and salary required.—Box 124, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

EMPLOYMENT REGISTER.

Conducted by the Institute of British Foundrymen by courtesy of the proprietors of THE FOUNDRY TRADE JOURNAL.

Correspondence should be addressed to the General Secretary, Institute of British Foundrymen, 8t. John Street Chambers, Deansgate, Manchester, from whom full particulars can be obtained of this service.

Any employer wishing to communicate with a candidate should write to the General Secretary, quoting identification number.

20 YEARS' experience on electrical and general engineering castings, 2½ years as Foreman in light-castings trade. Thorough knowledge of moulding machines and continuous casting practice. Technically trained. (163)

POSITION of responsibility required by young Foundryman with first-class practical experience, including electrical, turbine, Diesel, and light engineering castings. Sound technical training. Highest recommendations. (164)

FOUNDRYMAN, age 28, requires position as Foreman, Manager's Assistant; has had sound experience as Moulder in high-class engineering castings and in cupola control and mixtures. Good general and sound technical education. (165)

FOUNDRY Manager with wide experience, sound technical training, excellent credentials, is desirous of similar position. (166)

POSITION required as Foreman or Assistant to Manager by young Foundryman with exceptional practical experience in all classes of iron and non-ferrous foundry-work. Has held positions as foreman. Technically trained. Excellent references. (157)

SITUATIONS VACANT AND WANTED—*Contd*

POSITION required as Foreman or Assistant in Marine or General Engineering Foundry. Sound practical experience, including cupola practice. Age 37. (167)

PROPERTY.

MAGNIFICENT

11 ACRES WORKS SITE.

SHEFFIELD.

145,000 Sq. Ft. of Shops.

SIDING CONNECTIONS

with L.M. & S. and L. & N.E. Rlys.

WELL-BUILT & COMMODIOUS OFFICES

Will Sell whole or in lots to suit customers or Let on favourable terms. Unique opportunity for Manufacturers.

Apply—

THOS. W. WARD, LTD.,
ALBION WORKS, SHEFFIELD.

MACHINERY.

MOULDING Machines wanted, jolt ram squeeze turnover or hydraulic squeeze turnover, maximum box size 36 in. x 16 in.—Full particulars, price, etc., to Box 114, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

"MORGAN" TILTING FURNACES.

Three 250 lbs. capacity, coke-fired.
One 250 lbs. capacity, oil-fired.
One 450 lbs. capacity, coke-fired.
Two 600 lbs. capacity, coke-fired.
Two 600 lbs. capacity, oil-fired.
One 800 lbs. capacity, oil-fired.

Details and prices on application.
All furnaces are supplied relined.

A. HAMMOND, 14, Australia Road, Slough.

SIX Adaptable Moulding Machines, some with Turnover Attachment and practically new.

Three "Wallwork" Pneumatic Moulding Machines.

One Denbigh "Its it" Hand Jolter.

One "Ajax" Jarr Ram and Turnover Machine.

Sand Mills, with 6-ft., 5-ft. and 4-ft. pans.

Two Sand Mixers by Messrs. Hall; ball bearings.

One Rotating Sand Riddle, by Bonvillain & Ronceray.

Three 400-lb. M.R.V. Coke-fired Tilting Furnaces.

Also large stock of Double-ended Grinding Machines, Cupola Blowers, Exhaust Fans, Air Compressors and Electric Motors. Low prices.

Send your inquiries to S. C. BILSBY, A.M.I.C.E., A.M.I.E.E., 215, Barclay Road, Warley, near Birmingham.

THOS. W. WARD, LTD.

Six 9-in. Rotary Bar Cutting-Off Machines, by Butler & Company.

Bateman High-Speed Planing Machine, to plane 10 ft. x 3 ft. x 3 ft., with three tool-boxes.

Side-Planing Machine, by Geo. Richards, chain-driven, to plane 6 ft. long x 20 in. wide.

12-ton STEAM PILLAR CRANE (Chaplin), 46-ft. steel jib; vertical boiler.

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DITTO, 75 ft. high x 5 ft. 0 in. dia.
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